DOCUMENT RESUME

ED 274 006 CS 505 366

AUTHOR Beswick, Raymond W., Ed.; Williams, Alfred B., Ed.
TITLE Information Systems and Business Communication.
INSTITUTION American Business Communication Association, Urbana, Ill.
REPORT NO ISBN-0-931874-15-7
PUB DATE 83
NOTE 119p.
AVAILABLE FROM The Association for Business Communication, University of Illinois, 100 English Building, 608 South Wright St., Urbana, IL 61801 ($5.60 member, ($6.60 nonmember, prepaid orders only).
PUB TYPE Books (010) -- Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS *Business Communication; Business Correspondence; Business English; *Communication Skills; Database Management Systems; Data Processing; Electronic Mail; Higher Education; Information Dissemination; *Information Systems; *Technical Writing; Telecommunications; Teleconferencing; Word Processing

ABSTRACT

Intended to provide orientation about the integration of business communication, business systems, and the researching and teaching of business communication, this books offers articles on a variety of topics concerning business communication. Titles of the articles and their authors are as follows: (1) "Office Technology: Voice Store-and-Forward" (Raymond W. Beswick); (2) "The Integration of DP and WP" (Mona J. Casady); (3) "Automating the Small Business Office" (Peter B. Clarke); (4) "The Database: A Tool for the Business Researcher" (Marie E. Flatley); (5) "Introducing Dictation/Word Processing Systems in Business Writing Classes" (Jeanne W. Halpern); (6) "Audio Teleconferencing: A Practical Experience" (Richard J. Knecht); (7) "The Technology of Word Processing" (Zane K. Quible); (8) "Teleconferencing" (N. L. Reinsch, Jr.); (9) "Electronic Mail: How Will It Change Office Communication? How Can Managers Use It Effectively?" (Judith Stein and JoAnne Yates); and (10) "Telecommuting" (Alfred B. Williams). A list of vendor references is included. (SRT)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED274006

Information Systems and Business Communication

Edited by **Raymond W. Beswick**
Syncrude Canada Ltd.
and **Alfred B. Williams**
University of Southwestern Louisiana

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

R. D. Gieselman

TO THE EDUCATIONAL RESOUPCES INFORMATION CENTER (ERIC)."

American Business Communication Association
English Building / University of Illinois
608 South Wright Street
Urbana IL 61801

1983

CS505366

BEST COPY AVAILABLE

Printed in the United States—1983

Copyright for the articles appearing in this book remains with the authors. Permission to quote from or reprint any of the material in this book must be obtained from the individual authors.

ISBN: 0-931874-15-7

BEST COPY AVAILABLE

WHAT A FUTURE!

Larry D. Hartman
Manager, Software Documentation, Zenith Data Systems
and Past President ABCA

TERMS SUCH AS SYSTEM EMULATION, data base interchange, electronic posting, source origination, and file access sound like jargonistic descriptions of a modern Orwell's 1984, but they are not. These are terms associated with basic communication systems and fundamental communication skills functioning in many businesses and communication systems **NOW**!

Many of our time-tested beliefs about the needs of businesses, about teaching English fundamentals and communication principles, and about monitoring students as they write and communicate are conceptually correct and will remain so. However, there are 22nd century technological systems and 22nd century communication concepts insisting that we modify our traditional beliefs and pace our progress in business communication.

Teachers and practitioners in business communication tend to react rather than create or pace communication integration. This integration needs to complement business professors' understanding about what their students need to enter a profession; but, this integration also assumes a knowledge about operational procedures, communication systems, and communication skills used in these entry professions.

Information Systems and Business Communication provides one of several excellent orientation series about the integration of business communication and business systems and the researching and teaching of business communication.

Business managers do create their own reports and letters on terminals at their desks!

Dictation skills are essential in established word processing communication systems!

Letters, memos, reports and instructions are created at the desk and are stored and transmitted electronically anywhere within a network system at night!

Editing, formatting, proofreading and correcting messages on microcomputers, word processors, or other electronic terminals are accepted fundamental skills in today's businesses!

Electronic data base management, storage and retrieval systems exist and are established in small as well as large businesses!

Basic quantitative skills assist decision making and problem solving and assist with statistical applications, graphic displays, and charting!

Teleconferencing, videoconferencing and computerconferencing permit immediate access and instant feedback for business decision makers. These systems exist and are available in private businesses and are available for hire in hotels with national and international chains!

Teaching business communication and business writing cannot be textbook bound. Our discipline must expand and provide group dynamics training, oral communication, and nonverbal communication along with grammar, writing and reporting.

This is a time of excitement. This technological progress is not intimidating—it is evolutional. Integrate correct teaching principles, proper classroom techniques, and successful communication theory with business relevance. What a future!

ABOUT OUR CONTRIBUTORS

RAYMOND W. BESWICK chairs the ABCA Committee on Integrating Information Systems and Communication. He is responsible for office automation at Syncrude Canada Limited and is a partner in an office systems consulting firm. Ray is serving as one of the editors of this special publication.

MONA J. CASADY is a Professor at Southwest Missouri State University in Springfield in the Department of Office Administration and Business Education. She is a lecturer and writer on business communication, business education, office management, and word processing. In addition to being listed in several Who's Who publications, Mona is the author of *Word Processing Concepts*, *Great Outdoors Production Typing*, *Business Letter Writing*, and *Competitive Edge Production Typing* with South-Western Publishing Company. Her Ph.D. is from the University of Minnesota.

PETER B. CLARKE is President of Arcus Company, a business communications consulting firm. He received his B.A. from DePaul University and his M.A. from Purdue University. Peter is co-author of *Communicating Through Letters and Reports* which is now in its eighth edition.

MARIE E. FLATLEY is an Associate Professor of Information Systems at San Diego State University. She received her B.B.A., M.A., and Ph.D. from the University of Iowa. As well as publishing articles on written, interpersonal, and oral communication, Marie has authored articles on microcomputers and a text entitled *Filing Systems for Information Management*. Her current favorite research interest is in the area of high technology and communication.

JEANNE W. HALPERN, Director of the Business Writing Program at Purdue University, received her Ph.D. from the University of Michigan. Her recent book, *Teaching Business Writing: Approaches, Plans, Pedagogy, and Research*, was published by ABCA in 1983, and *Paper Voices: Effects of Technological Change on Teaching Writing*, co-authored with Sarah Liggett, will appear in 1984. She is currently writing a textbook, *Business and Corporate Communication*, with J.C. Mathes and Dwight Stevenson, scheduled for publication in 1984. A frequent speaker at professional meetings and consultant for business

and industry, Jeanne completed a series of lectures on the new technology of business communication in the People's Republic of China in the summer of 1982.

RICHARD J. KNECHT is an Associate Professor of communication at The University of Toledo where his teaching specialties include broadcast regulation, telecommunication policy, and television drama. All three of his degrees were awarded by universities in Ohio. His B.S. in communication is from the University of Dayton, his M.S. in communication is from Miami University in Oxford, and his Ph.D. in communication is from Ohio State University. In addition to his other publications, Richard is currently working with his wife, Antoinette, on "Effects of the Media: Societal and Technological."

ZANE K. QUIBLE is an Associate Professor in the College of Business Administration at Oklahoma State University. Zane received his bachelor's and master's degrees from the University of Nebraska and his Ph. D. from Michigan State University where he taught from 1971 to 1981. His teaching responsibilities at OSU include courses in business communication and office management. Zane is the author of four textbooks and numerous articles in the areas in which he teaches.

N. L. REINSCH, JR. is Associate Professor of Speech Communication at Oklahoma State University. Lamar holds a Ph.D. from the University of Kansas and is co-author of *Communication in Interviews*.

JUDITH STEIN is Director of the Communication Skills Program at the Yale University School of Organization and Management. She holds a bachelor's degree from Mount Holyoke College and a master's degree from the Columbia University Graduate School of Business Administration. Judy is the author, with Marya Holcombe, of *Writing for Decision Makers* (1981) and *Presentations for Decision Makers* (1983). She is especially interested in the effect electronic techology will have on management communication.

ALFRED B. WILLIAMS is an Associate Professor in the College of Business Administration at the University of Southwestern Louisiana in Lafayette. He received his Ph.D. from Georgia State University in Atlanta; his bachelor's and master's degrees were awarded from schools in his native state of Indiana. His teaching responsibilities at USL are in the area of business communication. He is the author

of several articles and is under contract with John Wiley and Sons, Inc. Being actively involved with ABCA, Al has appeared on both regional and national programs. In 1979, he co-hosted the Southeast regional meeting of ABCA in Lafayette; he was responsible for the program for the international meeting of ABCA in 1980 when it was held in Washington, D.C. Having worked as an editor for South-Western Publishing Co. in Cincinnati, Al is serving as one of the editors of this special publication.

JO ANNE YATES is Assistant Professor of Business Communication at the Massachusetts Institute of Technology. She directs the Sloan Communication Program at MIT's Sloan School of Management. She received her Ph.D. in English at the University of North Carolina at Chapel Hill in 1980. Currently, JoAnne is studying the development of internal communication systems in American businesses in the late nineteenth and early twentieth centuries.

TABLE OF CONTENTS

Foreword iii
About Our Contributors v

OFFICE TECHNOLOGY:
VOICE STORE-AND-FORWARD 1
Raymond W. Beswick

THE INTEGRATION OF DP AND WP 9
Mona J. Casady

AUTOMATING THE SMALL BUSINESS OFFICE 17
Peter B. Clarke

THE DATABASE:
A TOOL FOR THE BUSINESS RESEARCHER 47
Marie E. Flatley

INTRODUCING DICTATION/WORD PROCESSING
SYSTEMS IN BUSINESS WRITING CLASSES 55
Jeanne W. Halpern

AUDIO TELECONFERENCING:
A PRACTICAL EXPERIENCE 67
Richard J. Knecht

THE TECHNOLOGY OF WORD PROCESSING 71
Zane K. Quible

TELECONFERENCING 85
N. L. Reinsch, Jr.

ELECTRONIC MAIL
HOW WILL IT CHANGE OFFICE COMMUNICATION?
HOW CAN MANAGERS USE IT EFFECTIVELY? 99
Judith Stein and JoAnne Yates

TELECOMMUTING 107
Alfred B. Williams

Vendor References 115

OFFICE TECHNOLOGY: VOICE STORE-AND-FORWARD

Raymond W. Beswick
Syncrude Canada Ltd.

VOICE STORE-AND-FORWARD (VSF) SYSTEMS are similar to telephone answering devices in that they record a voice message on a magnetic medium and use the telephone for inputting. But, VSF is also very different in concept, and, because of the application of computer technology, VSF has many more features than telephone answering devices.

CONCEPTS

The major conceptual difference between telephone answering devices and VSF is that VSF systems are "closed," that is, you must know the system's telephone number and may have to provide a password before you are allowed to access it. Instead of telephoning someone and being surprised by a telephone answering device, you know in advance with VSF that you're going to leave a voice message. You deliberately choose to leave a voice message rather than talking directly to the person on the phone.

A major distinction between telephone calls and VSF is that the recipients control when the messages are taken. Rather than being interrupted by phone calls, owners of voice mailboxes call in for messages at their convenience. Another difference is that you know your message will get through—you don't have to play "telephone tag" and you don't have to worry about someone transcribing a message incorrectly.

VSF may be as close as voice communication can get to a written communication.

OVERVIEW

VSF overcomes many of the disadvantages of both telephone and written communication. But, it can supplant neither two-way telephone conversations where interaction or an instant response is required nor written communication where legal concerns predominate, highly complex material is being presented, or the communication is very long.

VSF will likely be used to replace short pieces of written communication such as requests for information, replies to requests for information, notices of meetings, confirmation of attendance at a forthcoming meeting, or other relatively informal communications.

When interfaced with a good storage-and-retrieval system, VSF may be used to replace more formal written communications. These will likely be internal memoranda where legal concerns are not of great importance but where some record is required.

When integrated with text and graphics systems, VSF will likely be used to add voice annotations. Such annotations should take the place of most "marginal notes" and "minute sheets" which are typically used to record comments.

VSF will likely replace most telephone calls where an immediate response is not required or where the caller knows an immediate response will not be available. (When VSF becomes common, woe to the caller who interrupts someone with a phone call when a voice message would have sufficed.)

Some short meetings might even be replaced by VSF.[1]

VOICE STORE-AND-FORWARD IS ANOTHER MODE OF COMMUNICATION

Now let us return to the points made earlier about deliberately choosing to leave a voice message and the analogy of VSF being the voice equivalent of written communication.

VSF is another mode of communication; it is in addition to written, face-to-face, and classic telephone communication. Why would one choose it over the other modes?

Given people's preference for using the telephone instead of writing, VSF may be used to replace some written communications.[2] An examination of some of the advantages of telephone and written communications will shed some light on potential VSF usage.[3]

Advantages of Telephoning over Written Communication

What follows are some of the advantages of telephoning over writing and comments on how VSF compares:

1. **speed** - VSF gets the message to a voice mailbox faster than any written communication could get to an ordinary mailbox. However, since picking-up the message is up to the owner of the voice mailbox, VSF may be slower than telephoning. Equally, it could be faster if compared to "telephone tag."
2. **immediate feedback** - The communication is "one way at a time" so VSF could not supplant telephone conversations where interaction is required.
3. **less time consuming** - VSF is even less time consuming than telephoning because most of the preliminary "chit chat" of real time telephone conversations is eliminated. Also, dictating voice messages is faster than dictating written communications.[4]
4. **psychological comfort** - VSF should be the same as telephoning although the capability of storing and recalling the message may lessen the comfort provided by not having to worry about punctuation, spelling, etc. It is likely, of course, that a different set of concerns will develop for VSF.
5. **quantity** - VSF should be about the same as the phone for getting more across than in writing.
6. **cost** - The cost per transaction will be the same as the phone if you ignore the capital cost of the VSF system. Since "telephone tag" is obviated, so are the associated costs in time and long distance charges. Also, VSF is "time zone insensitive" so you can send messages when the lowest rates are in effect.
7. **safety** - VSF is definitely not the same as telephoning since, unlike phone calls, voice message are stored and can be recalled in the future.
8. **personal touch** - Many people consider a telephone call more personal than a letter. In this regard, VSF should be considered in the same light as a telephone call.

Advantages of Written Communication over Telephoning

What follows are some of the advantages of writing over telephoning and comments on how VSF compares:

1. **ready reference** - VSF messages are stored and can be recalled. When the voice messages are integrated into a document retrieval system, VSF becomes especially attractive. There are document

store-and-retrieval systems available now which do not distinguish between what is stored, text or voice. These systems have a cover page for each document which is filled in by the user and contains such data as sender, receiver, date, subject, and keywords.

2. **legal advantages** - VSF does not offer much in this area. The courts have been very slow to recognize changes even in such relatively established areas as microfilm. So, it is unlikely that they will move quickly on voice messages and the admission of voice patterns to prove authenticity.
3. **enclosures** - VSF does not offer much here except in conjunction with electronic document distribution systems where you could use voice annotation of written and graphic material.
4. **reduced vulnerability** - VSF becomes the same as a letter. You don't have to give an immediate response; you can think about it and respond in your own time.
5. **technical data** - VSF is the same as the telephone for transmitting technical data; writing is better.
6. **timing** - VSF is the same as writing: recipients choose to review the mail (whether voice or written) in their own time.
7. **psychic benefit** - This benefit comes from receiving mail rather than a phone call. In this case, VSF will likely be considered as the same as a telephone call.
8. **reaching desired person** - VSF becomes the same as a letter. You will always reach the person you want providing you have the correct address (or in the case of VSF, phone number).
9. **involving many people** - Since VSF messages can be broadcast, they become the same as letters; the identical message is sent to all addressees.

TECHNOLOGY EXTENDS CAPABILITIES

The application of computer technology provides VSF with capabilities not available on telephone answering devices. Some of these are:

- **Voice Prompts** - VSF systems provide users with voice instructions on how to use the system, for example, "Press 1 to listen to your messages, 2 to record a message, or 3 to perform an administrative function." If you know what to do, you can just punch in the numbers without having to listen to the prompts.

Associated with voice prompts is verification of the telephone numbers to which you direct a message. Using voice synthesis, the systems speaks back the number you dialed and requests either confirmation or correction.

- **Playback and Re-record** - You can playback a message to see how it sounds and re-record it if you want. You cannot do that on a telephone answering device.
- **Broadcast** - You can send the same message to a number of people without re-recording it for each recipient. This can be done using a pre-stored list of phone numbers (which is recalled using a short code) or by dialing the numbers individually.
- **Variable Delivery Time** - You do not have to send the message immediately. You can direct the system to release it at a specified time on a given date.
- **Notice of Absence** - If the owner of a voice mailbox is going to be away, the date of return can be coded into the system. When someone dials the mailbox, the system advises them of the date of return.

The foregoing features are mostly for the sender of a message, but there are some features for the recipient, too. Some examples are:

- **Date/Time of Recording** - The system automatically adds the date and time a recording was made and plays this back before the message. (Users of telephone answering devices will know how frustrating it is to listen to a message and not know when it was left.)
- **Annotate and Forward** - The recipient of a message can add a note and then send the annotated voice message to a third party.
- **Reply without Dialing** - The recipient never has to dial the sender's number when a reply is sent because the system keeps track of the sender's number and dials it automatically.
- **Direct Delivery** - Owners of voice mailboxes can request the system to deliver messages immediately upon receipt to whatever phone number they specify, rather than their having to phone in for messages.

WHAT'S IT MEAN FOR BUSINESS?

Business is likely to adopt VSF very quickly because the payback is easily demonstrated and because it is a "standalone" technology—VSF does not immediately have to be integrated into an overall office automation system involving information processing departments.

Since VSF is "distance insensitive" people can use it from anywhere they have access to a pushbutton phone. Proper use of VSF should facilitate carrying on business normally even while employees are remote from their usual place of work.

VSF will permit better time management because there will be less frequent interruptions from phone calls and because people can plan when to get their voice messages. Further time savings will accrue from VSF supplanting some written communication and from the decrease in "telephone tag."

Direct cost savings should accrue from shorter long distance calls and from taking advantage of lowest rate times when making long distance calls. The "time insensitive" nature of VSF may add some qualitative benefits as might the "personal touch" of increase use of phone calls.

Business must be prepared to instruct their employees on the use and uses of VSF. Basically, training is needed in the preparation and presentation of short, coherent voice messages. In addition, courses in effective listening will likely be bolstered by the use of VSF. More research is necessary, however, before business can be expected to create good courses.

WHAT'S IT MEAN FOR ACADEMIA?

The major impact on academia should be in business communication research and courses—although, of course, academia may be a user of VSF as well.

At first glance, dictation skills would appear to be universally applicable to VSF. However, there is a major difference between dictation and VSF: dictation is speaking to create a message which will be read while VSF is speaking to create a message which will be heard. The mechanics of dictation (for example, speaking clearly) are applicable to both as is the notion of proper preparation. What is not clear, however, is how the message should be presented: what organization(s) work best? how long should the message be? what can we learn from research into listening? what voice inflection techniques work best? There are elements of many disciplines involved including composition, listening, dictation, and speech.

Research is necessary to verify the proper uses of VSF.[5] Research is also required on storing voice messages: what effect does storage have on creating voice messages and on the usage of VSF? does storage bolster the need for training in keyword indexing?

Voice store-and-forward is only one of many new office automation technologies. The effective use of all the new technologies will require much training and research. Both business and academia must be prepared to commit resources to this work.

NOTES

1. Jeffrey P. Graham and Robert C. Lerner, *Wang Digital Voice Exchange: A Pilot Project*, (Lowell, Massachusetts, Wang Laboratories, Inc., March, 1982), p. 24. The findings were that 63% of the study population replaced an average of 3.3 telephone calls each day, 46% replaced an average of 1.8 short memos per day, and 29% replaced an average of 1.7 short meetings each day.

2. Jody L. Clendening, Vernell K. Munson, and Duncan B. Sutherland, Jr., *Office Communication: A Study of Networks and Impediments*, (Lowell, Massachusetts, Wang Laboratories, Inc., November, 1981), p. 8.

3. The advantages are more fully described in Charles H. Hamed, "Phone or Write?," *The ABCA Bulletin*, Vol. XLV, No. 2, (June, 1982), pp. 46-47.

4. John D. Gould, "How Experts Dictate," *Journal of Experimental Psychology: Human Perceptions and Performance*, Vol. 4, No. 4, (1978), p. 657.

5. For a good review of the neglect already shown the telephone see N.L. Reinsch, Philip V. Lewis, and Paul D. Harper, "The Invisible Phone," paper presented at the 7th International and 46th Annual National Convention of the American Business Communication Association, Phoenix, Arizona, October 16, 1981.

THE INTEGRATION OF DP AND WP

Mona J. Casady
Southwest Missouri State University

OF THE VARIOUS TECHNOLOGIES that are part of a complete information processing system, two of the most popular ones to integrate are data processing (DP) and word processing (WP). The capability of the equipment to be connected and/or programmed is here. The purpose of this article is to highlight the following:

1. What DP and WP Share in Common
2. How DP and WP Differ
3. Why Should DP and WP Integrate?
4. Problems that Occur with the Integration of WP and DP
5. What Users Can Do to Prepare for the "Marriage"

WHAT DP AND WP SHARE IN COMMON

Both data processing and word processing were developed to achieve these goals in processing information:

1. Increased productivity (Processing work by automated machines is faster than by manual labor.)
2. Ability to handle larger amounts of information (The larger the volume of work the more feasible it is to use automated equipment.)
3. Less paper handling (Information can be stored on magnetic media, which takes less storage space than the comparable paper files; information is not printed on paper until it needs to be.)
4. Less physical (human) effort (Automated equipment can reduce the labor involved in performing routine, repetitive tasks; duplication of effort between departments is minimized.)
5. Better accuracy (Although equipment is only as accurate as the person who keys into the system, automated machines can perform at a higher accuracy rate than the average human being who performs the tasks manually.)
6. Lower cost (For large volumes of work it costs less with automated equipment than with only hand labor, for labor is the most costly factor in processing information.)

Both DP and WP are "systems"—not just machines. Each system involves specialized people, sophisticated electronic machines, efficient procedures, and a controlled environment. Yet, each system evolved as a result of the invention of a sophisticated machine. For data processing, it was the computer that was introduced in 1946; for word processing, it was the text editor that was introduced in 1964. For expensive equipment to be used to its greatest potential, office systems had to be reorganized.

The machines involved with DP and WP have many similar characteristics. First, each requires typewriting (keyboarding) skill to get information into the system. All of the machines are made of electronic circuitry and chips (tiny pieces of computer power). Both systems can be enhanced to do other functions by software packages (programs on a disk that direct the machine to do a certain function). Thus, computers can perform word processing functions; and, text editors can perform data processing functions. Both systems have the ability to send information electronically over telephone lines, via local area networks (LAN), or via larger networks (such as satellite communication networks).

Storage and printing devices are similar for the two systems. Computers provide both internal memory as well as disk or tape storage that can be stored off line (away from the machine). Text editors also have some internal memory (for temporary storage) as well as disk storage (for either temporary or permanent storage). Most word processing machines store on a floppy disk (called a diskette); however, storage can also be on a hard disk.

For data processing and word processing, technology continues to advance to bring greater capabilities to users. At the same time, competition has increased which has had the effect of lower costs. In turn, some vendors have decreased the amount and the quality of service and training.

The quote, "We learn from history that we don't learn from history.", has relevance to DP and WP. Both DP and WP have had to overcome resistance to change. For example, people fear that they will be replaced by a machine or that a machine will replace the personal service provided by a human being. Personnel of all levels of the organization structure have had to be educated to the fact that the reverse is true. The automated machines are tools that can help perform some routine tasks and thus free up time for more challenging tasks. People tend to fear any machine they do not know how to operate or do not understand how it can help in performing work. Technology has always been far in advance of common understanding and/or full application of the equipment's capabilities. Since DP

was developed about 18 years before WP, the word processing movement should have been smoother by having learned from the data processing movement. But the problems seem to be mutual, and they continue to exist in both systems.

On the bright side, both DP and WP have opened some challenging and rewarding career opportunities. Many new jobs have emerged, and the salaries are attractive.

The vocabularies of DP and WP share many terms that mean the same. Among them are the following: input, output, storage, logic, serial access, random access, magnetic media, terminal, work station, on line, off line, memory, flow chart, etc. For this reason, anyone who has learned about one of the systems can feel quite comfortable in learning about the other system.

HOW DP AND WP DIFFER

While data processing and word processing share some common elements, they certainly have distinctions. The following characteristics are unique to each:

Type of Information Processed. Although computers can perform some word processing functions and text editors can perform some data processing functions, each system typically specializes and performs its function better than any other system can. In other words, each system can best do what it was designed to do. Computers specialize in calculating, sorting, and merging data (numbers or figures). The results are communicated mostly within the company (internal communication). Text editors specialize in processing words (text). Communication is typically both within the company (internal) as well as outside the company (external).

Applications. Common DP applications include payroll, inventory, accounting, billing, and airline reservations. WP systems handle documents such as letters, memorandums, reports, news releases, and mailing lists.

Turnaround. In most DP systems, a job is either a permanently scheduled task that is performed periodically, such as end-of-the-month payroll processing, or one that has to be individually scheduled. Individual projects are usually scheduled several days or weeks before they are needed because the speed of turnaround is longer than 24 hours in most cases. In most WP systems, the speed of turnaround is extremely important. The author of a letter or memorandum would expect turnaround within 4-6 hours; rush assignments may need to be produced within 1-2 hours.

Scheduling. Scheduling work within a DP system is quite strict. Most applications take a block of time to process, and those that occur periodically are on a fixed or permanent schedule. Thus, the user of an individual project must adjust to the DP system schedule. In other words, "people must adjust to the system's schedule." WP, on the other hand, was designed to react promptly to the users' needs. Although certain tasks are fixed (standard or periodic), most tasks are spontaneously produced. Scheduling must be more flexible than in DP; this means "the system's schedule must adjust to the needs of the people."

Priorities. Scheduling and turnaround of a system depend on the priorities that have been established. For DP, the applications giving the highest return on cost are typically implemented first. Jobs are run according to the prearranged schedule. Those for which a program has already been written are usually done before those which require a new program. Top managers who are not versed in DP concepts or skills are more or less at the mercy of the DP manager.

For WP, priorities depend upon the urgency of the document. Both the users (or management personnel) and the WP manager are involved in determining the priorities of items to be processed. Then as work enters the system, it is distributed by the WP manager according to the pre-established order of priorities. Many facets help determine the order of priority—method of input (longhand vs. machine dictation), type of document (original document vs. revision of prerecorded document), length of document (1-page letter vs. 12-page report), etc.

In DP, the corrections (revisions) are accomplished when the task fits within the schedule. Depending upon its urgency, it may be done within a week or no sooner than six weeks later. In WP, revisions must be promptly made to meet turnaround goals of only a few hours.

Quality of Output (Print). Of course, accuracy as a quality of output is equally important to both DP and WP. However, the print of a document ranges from draft quality to letter quality. For internal communications, within which most DP projects fall, draft quality print is sufficient. Draft-quality printers are much faster than letter-quality printers. For external communication to appropriately reflect a professional image of the company, letter-quality print is required of most WP systems. Larger DP and/or WP systems typically have both draft-quality as well as letter-quality printers so that the one most appropriate for the task at hand can be selected.

Personnel. DP personnel are mostly men (although there are excellent opportunities for women), highly skilled, and most likely to

have a college education. Their personalities and job aptitudes are more "machine oriented" than "people oriented." Common job titles include: computer operators, programmers, systems analysts, and DP managers.

WP personnel are mostly women (although positions of all levels are also held by men), highly skilled, and most likely to have some college education. Their personalities and job aptitudes are more "people oriented" than "machine oriented." However, the operators of the text editors are "machine oriented," too. Here the difference between DP and WP is that DP personnel communicate with a smaller number of people within the company, while WP personnel communicate with a larger number of company users. Common WP job titles include: administrative secretaries/specialists, correspondence (or word processing) secretaries/specialists, WP coordinators/supervisors/managers, and WP (or office automation) consultants.

WHY SHOULD DP AND WP INTEGRATE?

Since many applications of companies involve both data manipulation and text manipulation, it is only natural to desire putting both functions under one roof. Here are two examples:

1. To select text (standard paragraphs or form letter) according to the characteristics (data—age, sex, occupation, etc.) of the addressee.

2. To create a client report (text) in which clients are listed alphabetically by last name (data); the table would include the account number, mailing address, and fees charged.

One of the principles of information processing is that any information (data or text) that has been correctly recorded by one system should not have to be rekeyed; duplicate effort should be eliminated. Merging DP and WP functions can provide more efficient use of resources (people, machines, supplies, etc.). It can reduce the amount of paper and storage space required for paper files. It can improve the cost effectiveness of the systems. Properly managed, it can enhance communication speed. Technologically, the door is open for the integration of DP and WP systems. But how easy is it to combine two systems that have so many differences?

PROBLEMS THAT OCCUR WITH THE INTEGRATION OF DP AND WP

By being aware of the potential problems that are obstacles to smooth integration, those who are involved or who plan to enter the field can better prepare. The following are some of the basic stumbling blocks:

1. While there are some terms that mean the same to DP and WP people, each system uses buzz words and has its unique vocabulary. For example, in WP the term "text editor" refers to a word processing machine; a lay person may think it means an individual who edits text.
2. Most people in DP know little about WP, and most people in WP know little about DP. Is each side doing all it can to learn about the other?
3. Each side has problems within its own system that prohibit smooth information processing. These individual problems need to be corrected before there can be effective integration of the two systems.
4. As stated earlier, people resist change. Change within a system is traumatic enough; merging two systems is even more traumatic.
5. Who will manage the integrated system? There is much rivalry between DP and WP for the position of managing information processing. Because most DPers are men and most WPers are women, it also becomes a contest between sexes. There are few qualified people in the industry who have equal experience in DP and WP.
6. There is risk involved in selecting equipment. What equipment is best for the needs of the company? How soon will the equipment become obsolete? Technology chases users faster than users can absorb and apply it to realize the maximum capability of the equipment.
7. In attempting to merge the two systems, there is often inadequate attention to the differences between DP and WP applications, procedures, and personnel.
8. Attention to proper environment for DP and WP systems is often lacking. Speakers and writers place emphasis only on people, procedures, and equipment without due respect for environmental factors. Lighting, temperature and humidity, noise control, wiring, work station layout, etc., are vital elements.
9. In selecting equipment that performs both DP and WP or in connecting DP and WP machines, two potential situations are often ignored: What happens during power failure or down time of the unit that houses the logic/intelligence of the system? What happens when user load is heavier than equipment capability?

10. Because DP/WP integration is technologically possible, is integration the best plan for the specific needs of a company? There are some progressive-minded companies that want to be leaders regardless of the price. Such companies are likely to hastily develop a sophisticated system without a thorough study of their companies' needs. Systems that merge without proper studying, planning, and implementing are doomed to failure.

WHAT USERS CAN DO TO PREPARE FOR THE "MARRIAGE"

The first step in preparing for the integration is to thoroughly understand how DP and WP systems are currently operating within the company. Also, careful identification of the company's needs should be made.

A wise selection of a qualified manager is vital. This individual must keep the various parts of the system in perspective: machines are tools that are used by a more valuable resource—people. Intelligence about the various technological systems must be coupled with the ability to lead and to motivate people. Data processing and word processing are but two of the many technological systems that help process information. A total information processing system involves the interfacing of all technological office systems—DP, WP, micrographics, optical character recognition, electronic mail, and phototypesetting, to name a few.

Anyone who plans to be a part of this fast-growing world of automated systems needs to learn about the various systems, to be objective and open-minded, and to get as much experience as possible. No one person can be an expert in all aspects of information processing, but each can develop a positive attitude that is exhibited by friendly cooperation with others. The process must be a team effort. Business communication students are likely to be some of these qualified team members.

•••

NOTES

1. Donna J. Campbell, "Integrating Data Entry and Word Processing," *The Office*, Vol. 97, No. 2, (February, 1983), pp. 30-34.

2. Paul H. Cheney, "A New Challenge—Word and Data Processing with a Mini," *Information and Records Management*, (May, 1981), pp. 24-26; 52.

3. Ivan Flores, "One Step at a Time,"*Words*, (June-July, 1981), pp. 46-49.

4. David Pomerantz, "Managing Information in the Eighties," *Today's Office*, Vol. 17, No. 9, (February, 1983), pp. 53-56.

5. Alan G. Rockhold, "The Office of Now—Merging DP and WP," *Infosystems*, (September, 1981), pp. 92-98.

6. Sally M. Saffer, "Word Processing—The Power Struggle for Leadership," *Administrative Management*, (June, 1980), pp. 36; 40; 66-67.

7. Dean F. Scheff, "Information Processing—The Future is Now," *Delta Pi Epsilon Journal*, (July, 1982), pp. 85-94.

8. _____, "Roadblocks to Office Automation," *Office Administration and Automation*, (February, 1983), pp. 28-31; 105.

AUTOMATING THE SMALL BUSINESS OFFICE

Peter B. Clarke
Arcus Company

ANY NUMBER OF DEFINITIONS of what constitutes a "small business" have surfaced recently. One business magazine suggested "any office having less than 500 people in it"—which would cover most of the *Fortune* 500 companies' individual locations. A private newsletter has defined a small business as any business that employs less than 200 people and grosses less than $25 million a year, a more reasonable definition.

However you define them, America's small businesses constitute a huge market. By 1990, according to one estimate, this market will consist of "13.2 million small businesses, professionals and at-home workers; 90 million households; and more than one million individual educational institutions."[1]

PLANNING

In planning to automate a small office, the first question managers usually ask is "What can office automation do?" The normal tasks in an office that lend themselves to automation are:

1. Correspondence and documents—dictated and self-authored.
2. Mail—message and document distribution.
3. Administrative support—bookkeeping and accounting.
4. Filing—document storage and retrieval.
5. Decision support—executive information systems, presentation of analyzed information for decision-making.
6. Small computing tasks—calculator or personal computer.
7. Database access—to internal and external databases.

For an organization first approaching office automation, the initial step is to look closely at the organization's operations to determine which lend themselves best to automation. Not all operations will for every office. The sheer diversity of what small businesses do, and the office tasks they perform, can make even categorizing them difficult.

In any case, planning usually involves four steps:

1. Examining the requirements.
2. Deciding upon the applications.
3. Investigating the equipment available.
4. Learning about the technology of the new systems.

Examine the Requirements

People in small businesses usually find it difficult to look objectively at what their businesses require from office automation. Reactions vary from a naive belief that purchasing a computer will automatically make all their procedures lightning fast and absolutely accurate to a wary suspicion that this newfangled machinery may put them out of their job.

As I will point out repeatedly in this article, the one essential step in avoiding trouble with office automation is to involve the workers who will operate the equipment in the planning from the very start.

The value of an outside consultant becomes obvious during this first step in planning. A fresh outlook, a "new pair of eyes," can be exactly what is necessary to help determine what the business requires of its office functions. To simply electronically duplicate what the business presently does by hand is to fail to take full advantage of the capabilities of today's new office equipment.

Correspondence. Writing is an activity in every business, though it may vary from a few letters a day to lengthy and visually sophisticated reports. A company which sends out five or six letters a day hardly needs a dedicated word processor. On the other hand, someone who frequently does 400-page reports, complete with graphics and illustrations, will find anything else inadequate.

While most people readily accept the connection between writing volume and needed word processing sophistication, few understand the connection between word processing and data processing in a small business. Most business organizations need a letter quality printer (usually a daisywheel printer costing around $2,000) to give their correspondence a businesslike look. They can seldom justify a second printer, even an inexpensive one, for data processing. Thus, one printer will have to do for both functions, and some restrictions on hardware and software are going to surface because of this.

Mail. As with correspondence, volume is the determining factor in whether an office should automate its mail functions. Most managers understand and want the advantages of word and data processing (though they often expect too much at first); but, they are

frequently unaware that they can achieve economies by updating their mail operation.

Obviously, an office that sends out 12 letters a day hardly needs to consider "automating" its mail procedures. However, any organization that has a postage meter and finds its economical can probably save money by adding an electronic scale. For high volume operations, there is an enormous range of equipment, the most complex of which will fold letters and accompanying material; address the envelopes; insert the material; seal the envelopes; apply the correct postage; sort out ten or more pieces going to the same state by three-digit ZIP area or ZIP code; and, bundle them together. Few small businesses need such a sophisticated level of equipment; but, any level between it and the human tongue is available.

Filing. Strangely enough, filing—or document storage and retrieval as we consultants like to call it—is often a bigger problem for small organizations than for large ones. There are several reasons for this.

First, small organizations tend to store more documents per employee or dollar of sales or square foot of space or whatever than do big organizations. Part of the explanation is that both small and large organizations have many documents in common, such as tax reports. Another part is that small business managers are less knowledgeable about what to keep and will not throw away or put in storage what their big company counterparts do.

Second, small businesses generally do not have as much flexibility in utilizing space as do big ones. Small businesses cannot easily take advantage of the space-saving (and expensive) new ways of filing.

Third, small operations do not usually generate a sufficient volume of documents to be stored to justify microform, although that is changing as the costs of microform equipment and services drop.

Administrative Support. Administrative support covers bookkeeping, accounting, inventory records, payroll, and the like. Most small business managers will readily embrace automating this area of their operations since they have been exposed to a good deal of publicity about computerized accounting.

Frankly, for most small businesses, computerizing their bookkeeping/accounting procedures will not achieve any savings, and may actually increase operating costs. It takes just as long or longer to enter data into a computer as it does to post it by hand. The great advantage of computerized records is the ability to obtain frequent detailed reports on almost all aspects of the business which is not always a necessity in a small business.

However, if the same equipment can do both data processing *and*

word processing, then cost-justifying it is usually no problem. This, of course, is the reason for the tremendous popularity of the "small business computer," the machine that can "do it all." Unfortunately, the delusion that computers automatically do everything faster and without error is what leads so many small business managers astray when they get to the next step in planning office automation, deciding on what applications to get.

DECIDE UPON THE APPLICATIONS

Deciding upon the applications means deciding exactly how to satisfy the requirements identified in the preceding, planning step. We can discuss this within the same framework as we did examining the requirements, but with the addition of the other three normal office tasks: decision support, personal computing, and database access.

Correspondence. For most small businesses, data processing (administrative support) takes precedence over correspondence and document generation. For this reason, early in the planning stages most small business managers begin looking for a small computer that can handle their accounting needs. Unfortunately, they may purchase their adminstrative support hardware and software before giving any thought to word processing, or else add it in as an afterthought.

Whether the major activity on the new computer will be data entry or word processing, invariably the operator will transfer from using a typewriter; and, anything the small business can do to ease the transition is good. A consultant will at this point do what the computer-stores and other vendors fail to do: point out that most microcomputers do *not* have keyboards laid out in the standard typewriter arrangement. (Yes, I know there really is no standard, but most people consider the IBM Selectric "standard.") Computers are designed by computer people, which is why so many of them have computer keyboards or, like the popular Apple II+, a teletype keyboard.

A good consultant will also guide a client into choosing the software *before* the hardware. Good software becomes popular and the manufacturer can afford to generate versions to run on numerous different computers and operating systems. Thus, choosing a good software package will usually leave a wide choice in hardware. But choosing the computer first can very well limit the customer to one or two software programs.

Micropro's "Wordstar" is by far the most popular word processing program for small computers. "Wordstar" has been called the "Cadillac" of microcomputer word processing systems. Whether or not this is true, it does have more features than any comparable system. Recent programmed learning manuals have made "Wordstar" much easier to learn to use. The program is well debugged and MicroPro constantly updates and improves it. It is entirely adequate for long documents, something few other word processing programs can comfortably handle. "MailMerge," an auxiliary program, permits blending elements from two separate files, such as addresses and a letter text, to put out form letters. A spelling checker, "SpellStar," is available; but, "Proofreader", from Aspen Software Company, is superior.

Mail. As I pointed out above, if a small organization found a postage meter economical, it will probably profit by adding an electronic scale. These scales display the weight of an item placed on them, and when the class of service is keyed in (First Class, Third Class, Book Rate, etc.) will show the correct postage. For parcel post, keying in the zone will let the scale calculate the correct postage. It will also figure UPS charges from the zones and weights. All manufacturers have provisions for updating their products when rates change.

An electronic scale will not save an organization much time, but most electronic scales pay for themselves in one or two years by stopping the use, inadvertant or not, of excess postage.

Many manufacturers produce electronic scales, and unless an organization plans eventually to tie it in to other mailing equipment, which one to choose makes little difference so long as it has the needed features and will fit in the available space.

Filing. For most small businesses, the cure for their filing—or document storage and retrieval—problems seems to fall into one of three categories: (1) their conditions don't make it worthwhile changing anything, (2) they need advice on what to keep and what to discard or put into storage, and (3) they should go to microform.

Many small businesspeople, for lack of knowledge, retain far too many documents for far too long. Education as to IRS requirements and some sound advice on how long to keep routine documents usually begins to cure the problem. Placing files that are unnecessary for daily operation of the business in dead storage generally completes the cure.

When a small business has large files and needs to access them, space always seems to be the problem. If the business can justify it, microfiche is the answer. The cost of microfiche equipment has been

steadily dropping, and a complete system to make, read, and print from microfiche is well within the cost of most organizations. (Bell & Howell and 3M are the leaders in microfiche.) Indeed, a microfiche system may not be much more expensive than re-equipping with new space saving cabinets with power-driven bins or drawers.

Administrative Support. Since computerizing their bookkeeping and accounting is usually uppermost in the minds of small business managers, they are receptive not only to the idea of a small computer, but to tying other office operations into it as well. Keeping them from concentrating on the hardware first is often a major problem; but, the best software, because of its popularity, usually runs on a number of systems. Choosing a good data processing program, therefore, generally leaves a number of choices open for the hardware.

The first step in choosing accounting software, however, is usually a disillusionment for the client. The rule for small organizations is: Never attempt to alter software to adapt it to the organization's existing accounting procedures; instead alter the organization's accounting procedures to adapt them to the software.

Managers, and their accountants, will balk at this, and converting them sometimes requires a good deal of education. The reason for changing the organization's accounting procedures to match an existing commercial software package is purely and simply to save money. The current best and most popular accounting systems for microcomputers are those produced by Peachtree and BPI, with Peachtree the leader. A complete package—general ledger, accounts receivable, accounts payable, payroll, inventory control (if the organization needs all five elements)—costs less than $2,000. The last time I got bids from independent programmers to alter an existing accounting system for a client, the two bids received were both over $12,000. And, neither programmer would guarantee that the alterations would work! Building a special accounting system from scratch is out of the question for any except large organizations.

Decision Support. Decision support generally includes executive information systems, presenting analyzed information for decision making. In the small business this is seldom as complex (or needs to be) as in a large corporation. For most small organizations, decision support involves using one of the "spreadsheet" programs—VisiCalc, CalcStar, SuperCalc, or another—to play out "what if" scenarios.

A spreadsheet program allows the user to enter figures into a grid, using any desired headings across the top and down the sides, and then perform mathematical operations on the data. Any change in

the data or in the operations is immediately reflected in the row and/or column totals. A spreadsheet is ideal for determining what the effect would be of, say, a 5% increase in sales volume coupled with a 2% increase in manufacturing costs.

Personal Computing. Most small business managers who place a microcomputer in their office soon begin using it for small computing tasks. Common are appointment calendars, personal budgeting and check-management, personal mailing lists, income tax preparation, investment tracking and analysis—in short, the numerous things computers can do well. For widely sold computers (Apple, IBM PC, TRS-80, CP/M systems), many such programs exist and are readily available.

Database Access. Accessing databases,whether in-house or remote, is conventionally listed as the seventh normal office task, though it is primarily a computer, or automated office, function. In a small business, internal or in-house databases usually consist of customer mailing lists, lists of suppliers, and accounting data. Accessing them is a common daily task.

Accessing remote or external databases is usually more important to large organizations, especially those with multiple locations, which need to transfer data back and forth. Small organizations generally access commercial or independent databases or services on an as needed basis. Such access can be very expensive, and until prices drop, few small companies will make as much use of such sources of information as they should.

On a personal level, numerous small businesspeople subscribe to Dow Jones News Service and Stock Market Quotes to keep up to date on the market and their investments.

INVESTIGATE THE EQUIPMENT AVAILABLE

Throughout all the previous planning, the people who will actually work with the new equipment should have had an active part. Getting them involved early is the biggest thing a business can do to head off resistance to automating the office.

For a small business, investigating the equipment usually means looking at microcomputers, printers, disk and diskette storage systems, monitors, electronic scales, and filing systems.

Computer. Assuming the data processing, word processing, and other software have been chosen, suitable microcomputers are those that will run it. In the usual order of priority, the microcomputer to purchase should:

1. **Run the chosen software.** In some cases, a small business may find it desirable to trade off. For instance, it may be worth taking a computer that requires extra-cost peripherals to run an operating system in order to get a typewriter keyboard, or to accept a less-than-totally-satisfactory keyboard to be able to use, say, double density minidiskettes.

2. **Have adequate disk storage.** CP/M is a widely used operating system on 8-bit microcomputers, but it tends to "crash" (lock up with loss of data stored in the computer's memory) if the user attempts to record more data on a disk than the disk has room. As another example, a great many programs are available for Apple II+, but the Apple disks hold a very small amount of data. Winchester hard disk drives are on the market for most microcomputers; and, they can store masses of data. However, not all of them actually remove erased (old) data from the disk; they fill up quickly. Until removable cartridge hard disk drives become more readily available, double density, double sided 5¼ inch diskettes are a good answer.

3. **Have a typewriter-style keyboard.** The transition from typewriter to computer is much easier and less anxiety-laden if the user does not at the same time have to become accustomed to a new keyboard layout. Beyond the layout, look for a keyboard with the keys in a comfortable arrangement and with a good "tactile feel" or "bounce." For an office, a separate or detachable keyboard (one that is attached to the computer by a cable) is not as desirable as it may be for home use. Few offices have furniture set up for use of a separate keyboard, and using one held in the lap or on a too-high desk is poor practice.

4. **Have readily available parts and service.** Only a year or two ago, parts and service might have headed this list. Today it is not the problem it was. Microcomputers are all made up of basically the same parts, and RCA, TRW, and Sorbus, among others, have nationwide parts and service facilities capable of repairing just about any brand. The better computer stores also maintain service departments for the brands they sell.

Printer. Since almost all small businesses conduct correspondence as a part of their business activity, they require a letter quality or "daisywheel" printer. These are impact printers, forming characters by a key striking a ribbon between it and the paper. Their output is as good as and often better than good electric typewriters. The leading brands are Diablo (Xerox), NEC, C. Itoh, and Qume. These daisywheel printers are generally compatible with most microcomputers and microcomputer software.

Below the daisywheel printers in price and quality of output are

the dot matrix printers. The most popular are Epson, NEC, Anadex, and IDS. These printers form their characters by pressing small rods against the ribbon to make patterns of dots, the familiar "computer style" of type. Some of them can print so many dots so close together that the characters appear to have been made by impacting a key, but in this mode they are painfully slow.

Disk Storage. Disk drives and disks come in a bewildering variety of types, sizes, and capacities. Here are some points regarding disk drives.

First of all, in the world of microcomputers, disk drives do not just plug into the computer. They plug into a controller card, a circuit board that interprets the computer's signals into signals the disk drives can understand and performs all the housekeeping chores necessary to operate the drives. While most computers come with one or two disk drives and a controller, you can almost always get them without and so use another type of drive and controller—if such exist and are compatible.

Small computers can handle a surprising amount of data, far beyond the capacities of their relatively limited memories, if a software program is disk dependent. This means that as data is needed the computer's memory is cleared and the data retrieved from the disk. After the data has been changed or updated, the program returns it to the disk for storage and brings up the next section. "WordStar," the word processing program, works this way. In such operations the limit is the capacity of the disk to hold data, not the capacity of the computer's memory.

At the present time, the most cost effective disk storage is 5¼ inch minidiskettes, double density, double-sided. These diskettes and the drives to use them allow recording on both sides of the diskettes. Data is recorded at twice the usual density (double density), permitting up to more than half a million bytes of data per diskette, depending on the system. Twice this much capacity per minidiskette is available in "quad density" diskettes, but the technology is not yet reliable enough for business use.

For really big data storage capacity, most people go to hard disks, the "Winchester" drives. These are usually sealed units in capacities from 5 million to 20 million bytes. Hard disks are somewhat more reliable in operation than floppy diskettes and much faster when the computer is searching for data. Some hard disk drives, however, do not actually erase unwanted data from the disk but just from the "index," so that the disk fills up quickly. The answer to this is just coming onto the market, cartridge hard disk systems. Rather than being sealed, these drives accept hard disks in non-removable protective

cartridges that slip in and out of the drive much as floppy diskettes do. These new drives have the advantages of both hard and soft disk systems and should be in wide use by the end of 1983.

With hard disk storage, the problem of backing up the disk, keeping duplicate records, arises. Most small users record files on minidiskettes as well as the hard disk; but, this obviates a good deal of the hard disk's advantages of speed of operation.

Unfortunately, the same problem afflicts minidiskettes and hard disk drives for microcomputers: no standards exist. The standard for 8-inch floppy disks is the IBM standard. All 8-inch disks, unless otherwise specified, come formatted for the IBM standard and are interchangeable between computers. (Some double and quad density 8-inch drives are available, but have not achieved much popularity.)

The lack of standards for minidiskettes and small hard disks means that most microcomputers run under one of the many operating systems and require disk drives and controllers to match. Apple diskettes will not run in IBM PC drives, IBM PC diskettes will not run in the Televideo 802 drives, Televideo 802 diskettes will not run in Osborne I drives, and so on. This lack of compatibility has held back the acceptance of small computers in large companies; but, it is not a major factor for small ones.

Small organizations do not generally have multiple locations, nor are they usually spread over more than one floor of the same building. Transporting data from one computer to another is no problem for these organizations since they can settle on one brand of microcomputer and type of diskette storage for all their workstations. Most of them are small enough that they do not even network (interconnect) their microcomputers, but just pass diskettes back and forth.

For the small business, then, the goal should be maximum storage capacity consistent with reliable performance. At the present state of the art, that means double density, double sided 5¼ inch minidiskette drives. Over the next two or three years, cartridge-type Winchester hard disk drives will come into popularity; but, the minidiskettes will remain in wide use for at least another decade.

Monitor. If a computer does not print out data in hard form, on paper, it will show as on a CRT or video screen, a monitor. Most microcomputers can use a conventional television set; but, the display will be unsuitable for business use since television sets are low-resolution displays. Monitors made specifically for computer display are high-resolution screens and are a must for business use.

Small businesses do not generally require color monitors. High-resolution color monitors are necessary for displaying color draw

ings, charts, and graphs; but, you pay for this capability in the poor quality of their display of textual matter. Letters tend to be fuzzy and distorted because only a third or less of the phosphor dots on the screen are activated for the display. Color graphs are very nice; but, they require fairly sophisticated programs and much time to construct. Black-and-white graphs can convey the same information virtually as well, and with a great deal less effort and expense.

Since microcomputers in small businesses show mostly textual or statistical matter, 12-inch or 13-inch green-on-black or amber-on-black monitors are satisfactory. Green or amber monitors are better than white-on-black monitors since users can look at them for longer periods before encountering fatigue. The 12-inch or 13-inch size is the minimum for an 80-column display (80 characters wide). You can use a 9-inch monitor or even a 5-inch monitor for an 80-column display—but not for very long.

Some microcomputers, like the Televideo 802, come with the monitor built in, but most do not. Fortunately, interfaces between microcomputers and television monitors are standard, so that a business can usually plug its computer into any monitor. Most monitors today perform very well with good reliability. Among the most popular and readily available are Panasonic, Sanyo, Zenith, BMC, and Amdek.

Electronic Scales and Electronic Mail. Electronic scales for small offices come with a bewildering range of features, but a good rule of thumb is that the more features wanted, the higher the price will be. And the price can escalate very quickly. Basically, an electronic scale should display the weight of a piece of mail. When the user keys in the class of mail or UPS service wanted, the proper postage or UPS fee should display. (For Parcel Post and UPS service the zone must be entered.) The postage meter can be integral with the scale or, most commonly, a separate unit.

Businesses can order scales with many capabilities beyond those listed above; but, the price goes up fast, and many of the additional features may see little use (count pieces of mail in each class, special overseas air mail rates, private courier rates, and the like). The heart of an electronic scale is a memory chip that the microprocessor inside the scale accesses for data. When rates change, the manufacturer will send a new memory chip to the user. Pitney-Bowes is still the leader in the field; but, many companies make electronic mailing equipment, and their products all seem to be pretty good.

Small businesses and other small organizations have made little use of electronic mail. Telex is popular but facsimile transmission is not because it is expensive, compatibility problems exist, and both

parties must be set up to use it. As an alternative, small organizations are adopting the computer hobbyists' "modems," devices that allow microcomputers to "talk" to each other over telephone lines. Data transmission by modem is slow; but, most users economize by waiting until after business hours to take advantage of low telephone night rates.

Users of modems can enjoy a bonus. Computers which are otherwise incompatible can often exchange data through modems since the data goes direct from computer memory to computer memory, bypassing the incompatible operating systems. Once the receiving computer has the data in its memory, it can store it on diskette for further use. (In fact, using two modems connecting two computers is a favorite method of "pirating" a software program otherwise inaccessible because of copy protection.)

Filing. Small businesses often find it difficult to improve their filing procedures. Many have elementary filing needs or special requirements, such as filing engineering drawings. In the latter case, they will already have purchased the special cabinets used to hold large drawings.

Because the new sophisticated filing equipment is very expensive and because most small organizations do not have the physical space to install them, the choice is almost always either to "fine tune" present files or go to microform.

Most small businesses, because of lack of knowledge, keep too many files for too long. IRS requirements aside, few documents need be kept handy after they are three years old. Unless the requirements of a business prove different, it will probably be safe in throwing out any files more than seven years old (tax and legal excepted), and putting any files more than three years old, but less than seven years old, into dead storage.

When a small business has large amounts of records and needs to access them frequently, it should consider microform. Current microfiche systems, as exemplified by those of 3M and Bell & Howell, are becoming quite economical; and, small organizations now can usually justify the cost of a system to catalog, store, read, and print from microfiche. Making microfiche copies of documents can be done in-house or by a company specializing in such a service.

Because microfiche has been in use for many years, a good deal of used equipment is on the market; small companies especially should consider used equipment dealers as a source. An extremely sophisticated refurbished older system with all the "bells and whistles" may cost no more than a stripped-down new system.

Converting existing records to microfiche can be a nervewrack-

ing (and expensive) experience, but once the system is in place and operating, most users become solid converts to its virtues. Indexing programs are available for most microcomputers, thus removing one of the biggest costs of a microform system, the independent catalog.

If an organization makes the decision to convert to microform files, it should not be deceived by the apparent economies of roll-type microfilm. Roll microfilm requires the user to begin at the beginning of the roll and then spool forward until arriving at the wanted frame. After accessing the frame, the roll must be rewound back to its starting point. This procedure averages more than a minute to access a specific frame once a roll is in the viewer. Once a microfiche is in the viewer, access time to a specific frame is about five seconds, and there is no rewind with which to contend.

Microfiche is an expensive form of document storage and retrieval, and no organization, whatever its size, should adopt it without long and careful analysis. Be aware, especially, of the cost of producing full-size paper copies of fiches; this will be a major part of the operating cost of the system, along with reducing new documents to fiche form. But, if an organization justifies microfiche document storage and retrieval, the final operating economies can be very substantial.

Learn About the Technology of the New Systems

Before leaving the subject of planning small office automation, we need to touch on several general points.

First, any manager considering office automation is caught in a dilemma. The organization needs the benefits of office automation now, but the manager doesn't want to risk being caught with obsolete equipment. It seems as if every month brings some startling improvement in equipment; and, just a little wait will make all sorts of new wonders available.

The answer to the dilemma is not to wait. Once the organization has soundly determined its needs, it should go ahead and purchase or lease the most reliable available technology that will do the job. The people involved must realize that no matter how long they wait, new technology will keep coming. In fact, the longer they wait, the more difficult it will be to convert to automated procedures because technology will keep progressing further and further beyond what the organization presently does.

Similarly, many managers would like to wait for prices to drop further. Indeed, prices of some new high-technology office equipment

do seem to get lower every day. But the truth of the situation is that the everyday costs of running an office are increasing every day, especially for those offices using costly, inefficient, obsolete procedures and equipment. No economy exists in waiting for lower prices because doing so entails a costly postponement of benefits.

Small business managers who enter upon the third step in planning, investigating the equipment available, often feel they have come into a jungle. The confusion is immense. For instance, at present more than 140 companies sell word processing equipment. Among these companies there is no standardization in local networking, training, communications, or operating systems. The same confusion exists in microcomputers.

Some managers turn to computer specialists to advise them; and, at first, it seems the specialists are the answer. They present simplistic frameworks to satisfy an organization's needs, but their systems tend to become appallingly complex when finally running on (big, complex) computers. Regardless of the organization, such specialists always seem to recommend an IBM System 3 or 4300 series computer—which only they can really understand—and expensive customized software—which, again, only they can understand. Fortunately, the estimated ultimate cost keeps most small businesses from falling into such a trap; but, in returning to the microcomputer marketplace, they risk falling into others.

As a good rule of thumb, never believe a vendor. While they may not lie, they never tell the *whole* truth. Apple dealers were selling Apple II + models when they knew, but would not tell, that the next day they would discontinue the II + and begin selling the Apple IIe, an improved model. MicroPro never announces new versions of "WordStar," but simply releases them as they become available. Users have to rely on dealers to tell them they can inexpensively update their "WordStars"—but the dealers would rather sell them new versions at full price. I do not know of any vendor who will tell a customer in advance that under the popular CP/M operating system, an attempt to record data on a diskette with insufficient space to hold it will cause the entire system to "crash," with the loss of any data that was in the computer's memory.

A business manager engaging in purchasing equipment to automate an office should get *everything* in writing, and sign *nothing* without first obtaining an attorney's approval. If the manager does not physically see the equipment the vendor plans to deliver to the office, the contract with the vendor should call for penalties for late delivery. Some retail computer dealers unaccustomed to dealing with businesses will refuse to consider such a contract (or sometimes any

contract at all). The manager would then be well advised to seek another vendor.

Perhaps most important of all, the contract should call for final payment only after the entire system is installed and operating satisfactorily. A word of warning here: never let the vendor use its own test data to prove the system operates properly. Vendor test data always works right. Use the organization's own data and test *every* operation.

Finally, the customer should consider putting into the contract fines for each day the software does not work. Machinery may need adjustment before it runs properly; but, no customer should have to correct errors in software, that is the responsibility of the vendor of the software; and, it may be a good idea to have the contract reflect that responsibility.

PERSONNEL AND RESISTANCE

In 1981, just less than half the workstations shipped went to administrative and secretarial personnel. A quarter went to managerial personnel and the small remainder to professional people. By 1986, better than a third will go to administrative and secretarial, more than a third to professional, and less than a third to managerial.[2]

Executive Resistance

The coming drop in workstations (computer terminals) destined for managers appears to be due to the long established focus of office automation on support staff and the evident reluctance of managers and professionals to use terminals themselves. Analysts usually give seven reasons for executive resistance to using computers:

1. Much computer data are too detailed, too irrelevant, or obsolete.
2. Present computer data do not provide the broad range of information senior management needs and do not usually provide it in a usable format.
3. Many current executives lack the expertise needed to use computers—they do not know how to get data out of them and often do not know how to use a keyboard.
4. Handling and storing the massive volume of computer-generated data are big problems. Magnetic media have special requirements.

5. Computer-generated data are generally suitable for day-to-day tactical decisions, not for long-range strategic planning.
6. Executives want current summaries, not a mountain of data that may be obsolete before they can analyze it.
7. Many executives feel that using a terminal themselves is demeaning, much as doing their own typing would be.

For small business managers, these reasons for resistance may appear to be insuperable obstacles to ever personally enjoying the benefits of office automation, and it takes a good deal of persuasion and hand-holding to convince them otherwise.

If the organization has involved the workers in the planning from the beginning (often easier in a small organization than in a large one), resistance to the new procedures and equipment should be minimized. Resistance to office automation is the subject of the next section of this article.

Employee Resistance

People resist office automation basically because they fear change. The answer is to include employees in the decision-making process. If they cannot take part in the decision whether to computerize, they should be involved in what equipment and software to purchase.

You can make a good case for paying more attention to personnel than to the equipment they will run when you consider that 15 years ago a secretary cost $6,000 a year and a word processor cost $20,000. Then, the secretary's satisfaction was secondary to justifying the cost of the machine. Now costs are reversed. A good secretary costs $16,000 or more—when you can find one—and you can get a word processor for less than $6,000.

Resistance to office automation comes in three broad stages:

In the first stage there will be anxiety, stress, turnovers in personnel, and rumors will be rampant.

In the second stage people will ridicule the chosen system, there will be innumerable delays in implementing it, and there will be elaborate excuses why the system won't work.

In the third stage people will sabotage the system, let static blow the computer, alter software programs, erase irreplaceable data, and physically destroy hardware.

Such a scenario results from three management mistakes:

1. Management chooses the equipment, then disassociates itself from the project, thus thrusting responsibility for making it work onto the workers.

2. Management should be interested and involved in the installation of the system, getting it up and running, but isn't.
3. The employees should have been involved in the planning process from the earliest possible date, but weren't.

Employees base resistance to office automation, especially to small computers, on six reasons:

1. Mathematics phobia—belief that computers only communicate in esoteric, high-level mathematics.
2. Foreign language phobia—belief that it is necessary to know COBOL, FORTRAN, ADA, RPG II, or some other difficult "foreign language" to use a computer.
3. Fear of job displacement—fear that a computer will replace the employee resulting in the employee being fired or demoted.
4. Fear of accountability or unaccountability—belief that they will be blamed for the computer's mistakes or that the computer will not be blamed for mistakes it makes.
5. Sense of powerlessness—a feeling that the world is changing too fast for human beings and that unaccountable machines are in control of humans' destiny.
6. Fear of change—actually a fear that they will not be able to adapt to coming changes, to cope with strange new ways of doing things, and fear that the world they know and understand is threatened.

Overcoming Employee Resistance

Small business management, because it is usually closer to its employees than management in large corporations, can implement steps to avoid resistance and, where it cannot be avoided, to minimize it.

First, management can get employees involved in the decision of which system to select. This will remove the element of strangeness and threat from the system and allow employees the maximum time to get used to the idea of automating their work.

Second, management can carefully plan the new environment. Some things to consider are whether there is sufficient space for the new equipment *and* the people who will use it; whether the space has enough power (new equipment usually means increased electricity use), enough ventilation (most electronic equipment generates heat), good acoustics (computer printers can be very noisy); and, whether it is easy to get to (putting the new system in a back closet is a signal to everyone that it is not important—nor are the people running it).

Third, management should consider user comfort. The old desks and chairs may not accommodate the new equipment. Office chairs, especially, may not adapt to the new use. Complete redecoration may not be feasible; but, the typing stand that held a typewriter probably will not hold a computer, disk drives, monitor, and possibly a detachable keyboard.

Fourth, as the project progresses, management should keep everyone involved, especially employees, and advised of changes. This is especially important if management reassigns responsibilities. Employees will need constant reassurance that they are safe from the automation monster; and, if they lose "what they have always done" to someone else, they will get new responsibilities in replacement. Employees also need reassurance that measurements of their productivity before and after installation of office automation will not be a basis for deciding whether they keep their jobs. Management should make clear that such measurements are only a tool to determine whether the automated office is meeting the organization's original objectives.

Fifth, management should take every opportunity to familiarize ultimate users with equipment. Employees can go to supplier schools if such are available. Perhaps a vendor can be persuaded to put a demonstration model in the office for employees to use. And in any case, managers should take employees to vendor locations to see equipment when feasible. Management should do whatever it can to stress the "user-friendliness" of the system.

Sixth, management should actively and continually promote the employee benefits of office automation to employees. This should never be in the form of doing work quicker and better; that appears from the employees' point of view to be merely a management attempt to get more work out of them for the same amount of money. Instead, management can make the general appeal to benefits arising out of increased business profitability; and, the stronger appeal to increased employee skills bringing increased responsibilities and hence promotions and increased wages.

Seventh, management should continue to educate and train users. This is good policy if only to keep a steady growth in employees, a general movement upward in the organization. It will also tangibly indicate management's commitment to office automation, to making it work, and to its employees.

Once office automation is in place and operating, management's job of fending off resistance is not over. Management should be prepared to follow up by continually monitoring the system. This will have three benefits: (1) it will force management to focus attention

on the system, (2) it will provide opportunities to review the daily operation of the system, and (3) it will help overcome any remaining "prove it to me" attitude through quick and accurate reporting to employees of measurement results.

If the organization is large enough, management can use questionnaires employing rating spreads to guage employee's reactions to the new system. Regardless of size, however, the main tool should be informal interviews—fortunately easy to hold in very small offices. Beyond the vital information coming from them, regularly continuing interviews prove to employees that management is concerned about their reactions to the system and interested in their suggestions to improve it, which management should be.

Except in the smallest businesses, management should put together a booklet explaining the system to new employees. This is essential because new employees may bring resistance to office automation with them. The booklet should also explain the history of the decision to automate the office, the goals and objectives of the system, and the benefits that have come from automation.

Overcoming employee resistance to office automation is a management task that should begin with the decision to first consider automation. It should never end.

We have considered people and their resistance to office automation. Now we will take up other barriers and so summarize all the barriers to successfully automating the small office.

Barriers

The barriers to office automation, in large organizations as well as small, fall into four classes: people, technology, organization, and vendors.

People. We have gone at length into people and their resistance to change. We can also take cognizance of people's need to feel they are in control, and realize that often people don't understand what office automation requires them to do (a result of a failure of management to communicate). The answer is, of course, to involve everyone who will be affected by office automation in the planning process at the earliest possible stage and keep them involved through installation of the system. Management must then follow up after the system is operating to assure that employees, new and old, are accepting it.

Technology. The technology that makes office automation possible can also be the biggest barrier to a small company implementing it.

The number of suppliers to choose from is overwhelming. The industry is presently in the midst of going from 8-bit microcomputers to 16-bit microcomputers, and this has introduced a raft of new manufacturers into the market. The new 16-bit microcomputers have lots of memory and they are very fast. They also don't have many software programs for users to run on them. Thousands of business programs may exist for 8-bit microcomputers, but most computers will run only a very few.

The technology is still incompatible. There are a number of different microcomputer chips. None of them are compatible with each other. Moreover, operating systems and data storage media are not compatible.

There are still too few communications standards to permit systems integration, but since small businesses seldom have multiple locations and have been able to use modems and telephone lines, incompatible communications standards have not presented nearly as much of a problem as have incompatible microcomputers, operating systems, and storage media.

A factor we have not yet considered is the security of small business computer systems and their data storage. Computer security requires unceasing vigilance against unintentional as well as intentional occurrences.

Organization. Small businesses, especially, are apt to be dominated by short-term goals. Owners/managers are likely to be concerned with day-to-day operation and have no idea how to go about long-range planning. More, they are frequently so close to the business that they cannot get a clear overall view of it.

Because they cannot clearly see all of their organization, small business managers may fail to understand the potential that office automation holds for improving operations. And, because they may not have had advanced business training, they may fail to understand the productivity cost/benefits office automation can bring or how to measure office productivity.

Finally, because small businesses often are still close to being (or still are) entrepreneurships, owners may demand the benefits without the costs, and totally lose interest when the impossibility of that is explained to them.

Vendors. The people who sell office automation equipment are often the biggest barrier to implementing it. Because they are usually on commission they are sales-oriented and hardware-oriented. Where a business should begin by finding, say, an accounting program that will meet its accounting requirements, a vendor will begin with whatever computer or computers it handles, try to sell one of those,

and worry about software later, if at all.

Because vendors are so sales-oriented, they will often attempt to change the customer's requirements to fit their merchandise, and, because the industry is so young, may be unsure of the customer's requirements. Frequently, vendors will look for "ultimate solutions," machines that will "solve all the customer's problems." No such miracle machines exist for any business, but whatever the vendor sells will be touted as the answer. Vendors almost always lack any expertise in planning, and the business that blindly follows one's recommendations may find itself locked into an unacceptable and quickly obsoleting system that cannot be upgraded.

Perhaps worst of all, few vendors seem to have any comprehension about the anxiety customer's employees have about technological change, and will thoughtlessly toss off something that will leave an entire office staff trembling in fear and shock. This usually happens because the vendor never considers that someone will have to sit at the machine and operate it, leading to statements like, "The Wonder-Computer will handle all, and I mean all, your correspondence." To a clerk-typist, that can only mean he or she is going to be replaced by a machine.

Vendors and their sales representatives should be approached very carefully, never believed unless they put it in writing, and kept strictly away from the customer's employees unless customer management is present.

In the remainder of this article, I will discuss some of the elements of office automation in more detail, and end by looking into the future.

DATA AND DOCUMENT STORAGE

In this section we will look at microforms in more detail, and then examine the potential for optical disks.

Microform

If an organization had large enough files and needed to repeatedly access them, microform should be the answer.

A consideration in comparing microform and magnetic media is that the current archival capability of magnetic disks, diskettes, and tape is five years. That is, you can expect significant deterioration of the magnetic signals in five years, possibly enough to distort stored data or make it inaccessible. The present archival capability of microfilm is more than 100 years.

Microform, sometimes called micrographics, has a number of very real advantages. Though traditionally microform was for inactive files, archival storage of dead documents, computer-aided retrieval (CAR) has made it perfectly suitable for active files. In terms of money, converting to microform (roll or fiche) can save users more than 80% in labor costs and more than 90% in material costs over traditional document storage methods.

Perhaps the biggest immediate saving from converting to microform is that of space. Microfiche, for instance, cuts storage space to 1/50 that needed for paper.

Using microfiche can also mean big savings in postage. Consider than a single 4-inch by 6-inch fiche can hold 300 to 400 pages of text and/or data. First class postage for a fiche in a good protective mailer is about 60 cents. Postage to mail 300 pages would run around $8.00.

Optical Disks

Optical disks have received a great deal of attention because they appear to present a way of cheaply recording enormous amounts of data and immediately searching and retrieving it. Unfortunately, the publicity is somewhat ahead of the technology: the storage is here, but not the read/write capability. Optical disks work, usually, by using a laser to record data on a sensitized surface, and then reading it with a laser. Every frame of a motion picture can be stored on an optical disk with room to spare, which means that a current 12-inch disk can hold more than a quarter of a million pages of data.

Recording on optical disk requires very sophisticated and extremely expensive equipment. It does not look now as if optical disks will become costs effective before 1990, except for those organizations with massive data bases. In addition, there are presently some technological problems. The disks need a very sensitive surface; but, this has meant a very short archival life. To extend the archival life will require a much less sensitive surface, a new technology. Further, at the present state of the art, bit error rates are far higher with optical disks than with magnetic storage media. The disks are suitable for recording a motion picture because the frames go by so quickly that a minute error is unnoticeable, but totally unacceptable for recording data. Finally, optical disks are not presently erasable, a major fault if they are to be used to store computer data since the disks will quickly fill with obsolete data, and destroying confidential information requires destroying the disk.

TELEPHONE

As late as 1958, Western Electric was still building cord and plug switchboards. Since then we have gone from automated PBX's using electro-mechanical switches to computer-controlled PBX's with electronic switching to digital PBX's that convert analog voice signals to digital data for nearly instantaneous switching.

Because digital PBX's change voices into digital data, they can readily integrate data and voice communication over the same wires. A digital PBX can perform the usual tasks of forwarding calls, speed dialing frequently-called numbers, automatically redialing busy numbers, routing long distance calls most economically, and displaying the name of the calling party. It can also allow the user to transmit and receive data while simultaneously conducting a telephone conversation.

The digital PBX operates at a low baud rate (it transmits data slowly), but it is sufficient for most data transmission, and for most small business requirements. It presents a good possibility for interconnecting workstations or computer terminals directly to those at other locations (the owner's home, for instance). More important, a digital PBX can interconnect all the data and word processing equipment in an office as well as the telephones. How many small businesses could take advantage of this is problematical, and in any case, the cost of digital PBX's will have to come down considerably before they become cost effective for small offices.

COMPUTER SECURITY

Protecting the security of data usually becomes a management concern after the catastrophe. Smart management will, therefore, plan to protect its equipment and its data before the system is in operation. Basically, businesses, whatever their size, need to protect against three things: (1) environmental disasters, (2) accidental errors, and (3) criminal activities.

Environmental Disasters

Keep computers away from windows and doors. They provide access for unauthorized personnel as well as environmental hazards such as heat, dust, water, and the like. And because heat is the great enemy of computer circuits, do not place a computer near a furnace or other fire hazard.

A fire extinguisher specially designed for electrical fires should be next to the computer; all computer operators should be briefed on how to use it. On the ceiling of the computer room, install a heat, smoke, or ion detector and couple it to a remote alarm in case of an emergency at night when no one is present. Install a "kill switch" in a convenient place to shut off all electricity in the room in case of possible fire or water damage—it could save costly equipment from short circuits.

Inexpensive devices are commercially available to protect electronic equipment from voltage changes, brownouts, and electric power failure. Installing one of these can protect connected equipment from damage and prevent loss of valuable data. Batteries in the protective device can provide sufficient power to transfer data from the computer to disk or diskette, and possibly for an hour or two of normal operation.

Finally, it's a good idea for a business to ask its insurance company to investigate its computer installation with an eye toward helping prevent possible trouble.

Accidental Errors

Despite the best efforts of brilliant computer designers and software programmers, office workers still find ingenious ways to accidentally lose data.

Trouble can arise from faulty programming. Not all manufacturers properly check out software before putting it on the market. For programmers, writing a new program is fun. Checking all its operations for bugs is dull, dreary work, and too often is left for the unsuspecting customer to correct. Generally, however, the more popular a program and the more microcomputers it will run on, the more likely it is to have been debugged and to run trouble free.

An accounting program with bugs in it can cause the loss of recorded data, requiring that someone reenter it (but, if the bug is still there, the data will be lost again!). At best, if a business identifies a bug in a program, operation must halt until it can notify the manufacturer of the bug and get the fix. If, as is usual, the program is in machine language or copy protected, the business cannot fix it and must return the diskettes to the manufacturer, meaning a delay of one to four weeks until the updated program is returned.

A very common problem is the documentation that comes with software programs. Programmers are not verbally oriented people; and,

unfortunately, they are the ones usually called on to write the manuals telling how to use their programs. To programmers, using their programs is extremely simple, so much documentation tends to be sketchy, very poorly written, badly organized, and without indexes. Software manufacturers who investigate having their documentation professionally prepared frequently refuse to pay the cost.

The complete original user manual for "WordStar/MailMerge/SpellStar" runs 370 pages, $8\frac{1}{2}$ by 11 inches, single-spaced! It contains an exhaustive treatment of every element of installing, modifying (if necessary), and using "WordStar" and its two auxiliary programs. A reference card accompanies it. It is cumbersome to use (no index but, thankfully, a detailed table of contents), poorly written, and strangely organized. The average office worker, taking one look at the size of the manual, would flatly refuse to try to read it. It is something of a tribute to the excellence of the program itself that it not only survived despite the manual, but achieved enormous popularity. In the last year a number of publishers have brought out manuals and training programs designed to help people learn to use "WordStar", and, they are proving as popular as the program.

Many reputable software manufacturers will sell manuals separately, allowing potential users to determine whether to purchase the programs (if they do the price paid for the manuals is customarily deducted from the cost of the programs). If at all possible, a small business should try to see a program up and running before buying it (preferably at another business, not in a vendor's showroom).

When a new or updated program is installed, the business should test it thoroughly, running all the operations with its own test data, to make sure all the modules of the program perform as they should. No small business should have to go through the experience of one concern that purchased an expensive but faulty accounting program, worked it for almost a month, and had the whole thing crash when the operator called for a month-end summary, with loss of almost all of the month's data!

The best guard against accidental errors by operators is to train them thoroughly. If this is to be a vendor responsibility, a small business should be sure that the level of training is spelled out in the contract. Unfortunately, in the world of microcomputers and their software, vendor training is the exception, not the rule. This is why good documentation is so vitally important; it may be the only source of training. In any case, good manufacturers will back up their software with user support; and, the best ones will provide a phone number to call for answers to technical questions.

Diskettes are a common source of accidental errors because they

all look alike. Only small labels describing their contents differentiate them; and, it is common for a hurried operator to place the master program disk in a drive and record data on it, wiping out part of the master program. The best programs will try to trap such erros, but cannot catch all of them. Users can take three important steps against misuse of diskettes:

1. Always make back-up copies. All sorts of things can go wrong with a diskette or a disk drive. For instance, it is common for heavily-used diskettes to suddenly develop bad sectors, making the data on them inaccessible. People will spill coffee on diskettes, lay cigarets on them, roll chairs over them and otherwise mistreat what are essentially very fragile recording media. If the software program doesn't prompt the operator to do so, it should be a matter of trained habit to record everything on two diskettes. It is far cheaper to buy another diskette than to spend hours reentering lost data—if it can be reentered. Workers should use back-up copies of all programs rather than the original diskettes whenever possible, and the original diskette should be safely stored.

2. Write-protect all program diskettes. Floppy diskettes have a square notch or notches cut in the side, and a disk drive must find this notch clear to record on the diskette. Diskettes come with pieces of metallic tape to place over the notches to make it impossible to record on the diskettes,and thus harm the programs already recorded on them. If the data on a diskette will not be changed or added to, then the diskette should be write-protected.

3. Purchase the best quality diskettes available. A high quality diskette may cost $5.00 to $6.00 and a cheap one only $2.00, but the cheap diskette is no economy when it loses data recorded on it or fails in the middle of a critical operation.

Finally, a business would be wise to make up a contingency plan against catastrophe. Suppose an operator does accidentally delete a month's orders or a bad diskette or program error messes up a month's billings? Making additional back-up diskettes of critical data and keeping them in safe deposit boxes could be done. Some also store the original program diskettes there. Keeping paper copies of everything for a year and discarding outdated material each month is another way. (This is cumbersome and makes work, but people who do it feel that it is worthwhile to have the feeling of reassurance that having everything backed up on paper gives.)

Criminal Activities

Small businesses appear to be less attractive to criminals than large ones, probably because small businesses do not have as much to steal. Nevertheless, any business, regardless of size, should protect its computer data, and here are a number of considerations for the small business person.

Allow no one into the computer room or near the computer unless they are known (qualified employee, identified repairperson, etc.). If possible, keep the computer area locked all the time, day and night. A business can also inexpensively install locks on most microcomputers and their peripheral equipment. The idea is to restrict access to the computer to a limited number of people, the fewer the better.

Employees who do use the computer should be accountable for its security. The business may want to go so far as to never allow any employee in the computer room alone at any time. The computer operators should maintain a log of all computer runs and management should review the log regularly.

Access to programs and data can be restricted by employing passwords, cryptography, and other security procedures, though businesspeople should realize that such methods will not present a permanent barrier to a determined, knowledgeable person.

Finally, both program and data diskettes should be kept in locked cabinets to protect them against theft, and back-up (or original) copies of programs and data should be in off-site storage such as safe deposit boxes.

A little thought and care will usually suffice to protect a firm's general records from theft or access. If a need exists to protect really sensitive data (designs, formulas, etc.), then management should consult a security specialist.

BLUESKYING

No one knows for certain what the future will bring us, but we can do some extrapolation based on current technology and trends in research.

Paper is becoming too expensive to ship from one place to another. The problem is that we will progress in delivering information, but not in delivering material things. By 1990 we expect portable electronic tablets incorporating microprocessors to take the place of much of today's paper. Text, data, and drawings will be send direct from tablet to tablet, probably utilizing existing communication links. This

is not to say that we will enter a "paperless" era. If that every comes, it will be far in the future. For the foreseeable future paper will continue to do many things of which no other technology is capable. What we will see, however, is a lessening in our use of paper and an increased reliance on electronic means of communicating and storing information.

During the 1980's, we will progress from a monitor built into or sitting on top of a computer to a screen on a wall, with the computer contained within the keyboard housing. In the 1990's, we will see a wall that is a screen, capable of displaying images of any size up to that of the wall itself. By the first decade of the next century, we will display data on a holographic wall.

Business will make increasing use of teleconferencing and then videoconferencing as the energy supplies dwindle and travel becomes prohibitively costly and then restricted. By the end of this century (that's only 17 years away!), we should have holographic videoconferencing in which it will be hard to tell the participants you face are not really on the other side of the table.

Electronic data storage will become the rule, and we may see massive storage facilities in space where the cold and vacuum can make data storage by molecular matrix a reality. Such a system theoretically could record the entire contents of the Library of Congress in a container the size of a one-pound coffee can.

Eventually, probably in the next 20 to 30 years, genetic engineering will alter human cells to interface directly with a microprocessor embedded in the head. What this will mean is instantaneous access to, say, the Library of Congress, or, for that matter, any database. It will literally be like having all the accumulated knowledge of mankind in your mind. The effects of such a development on our society, our economy, and our way of life are beyond comprehension. Eventually, researchers plan to restructure human cells to take over the functions of electronic chips, to literally "grow" computers as part of the human brain.

•••

NOTES

1. *Microcomputer Software Packages*, (International Resources Development, Norwalk, Connecticut, 1982).

2. "Management Workstations: Markets and Strategies, 1981-1986," (Advanced Resources Development, Medfield, Massachusetts).

THE DATABASE: A TOOL FOR THE BUSINESS RESEARCHER

Marie E. Flatley
San Diego State University

A DATABASE IS A POWERFUL NEW TOOL for business researchers. It is a collection of data organized for convenient and quick computer access. Researchers tell the computer the kind of information needed, and the computer searches the database for it. The databases that presently exist can generally be classified as general or specialized. General databases, which are designed for multipurpose use, include The Source, CompuServe, Delphi, and Dow Jones. They offer the user such services as information on a wide array of topics, news, electronic mail, sports, weather, airline schedules, travel, games, and much more. Specialized databases, on the other hand, attempt to service narrowly defined markets. These markets include such specialities as agriculture, arts, energy, environment, food service, humanities, law, medicine, science and social science, as well as business.

BUSINESS DATABASES

Within each specialty, there are general and specialized databases. The most widely used general databases for business researchers are Inform and Management Contents. Some of the specialized databases for business include Chemical Industry Notes, Economics Abstracts International, Orbit, The Predicasts Group, and Trade Opportunities. While there are many databases on varied topics, five are of particular interest to business researchers. These are Inform, Management Contents, PsychInfo, Orbit, and Microcomputer Index.

Inform and Management Contents are probably used most often. Inform contains citations and abstracts from over 550 business journals. These journals vary from widely read journals, such as *Business Week*, the *Harvard Business Review*, *Forbes*, and *Fortune*, to special interest publications, such as *Tax Executive*, *Commodity Journal*, *Vital Speeches*, and *Euromoney*. Management Contents, on the other

82011978 ID No: 82011978
The New Communication Technology
Forney, T. Michael
Public Relations Jrnl v38n3 20-23 Mar 1982 Coden: PREJAR ISSN 0033-3670 Jrnl Code: PRJ
Availability: ABI/INFORM
Doc Type: JOURNAL PAPER

The Information Age will alter the way in which public-relations practitioners perform their jobs, as well as altering the jobs themselves. Computers are being designed and sold for use by individuals at their desks, and research that would have taken weeks can now be accomplished in hours at a computer terminal. The point is fast approaching where information will be tailored to the individual and his/her needs, and videodisc technology will provide the avenue for a new segment of interactive information services. Due to changes in the information transmission and receiving process, audiences will become much more segmented; therefore, public relations specialists will have to do away with many ways they have been using to reach and influence their publics. Magazines, newspapers, employee television, and news wires of today will be replaced by more flexible and personalized communications techniques that can segment audiences extensively. Public relations practitioners will have to anticipate such developments and prepare for them.

Figure 1
Citation and Abstract from Inform

hand, provides current information on a variety of business and management-related topics to aid individuals in decision making and forecasting. Articles from over 400 U.S. and foreign journals, proceedings, and transactions are fully indexed and abstracted to provide information in the areas of accounting, decision sciences, finance, industrial relations, managerial economics, marketing, operations research, organizational behavior, and public administration. Included are such journals as *The Futurist*, *The Accountant*, *Business and Society Review*, as well as specialized journals, such as *Medical Economics*, *Journal of Business Communication*, and *Woman CPA*.

As you can see in Figure 1, the citation and abstract from Inform is complete yet concise. They give the researcher complete documentation for the source, and the researcher can usually determine from the abstract whether or not he/she wants to locate the original document.

Some specialized databases valuable to business searchers are PsychInfo, Orbit, and Microcomputer Index. PsychInfo includes worldwide literature in psychology and related disciplines in the behavioral sciences. Over 900 periodicals and 1500 books, technical reports, and monographs are reviewed each year to provide coverage of original research, reviews, discussion, theory, conference reports, panel discussions, and descriptions of apparatus. Since many business topics in organizational behavior, interpersonal communication and other related behavioral topics are covered, this is an excellent source for specialized business searches that are behaviorally oriented. Another specialized database is called Orbit. It specializes in accounting-related citations, including citations from journals such as *The Practical Accountant*, *Internal Auditor*, *Journal of Accountancy*, *Management Accounting*, and *CPA Practitioner*, to name a few. Orbit cites books as well as periodicals. It is an excellent source for those researching accounting-related questions. An example of an Orbit citation and an Orbit abstract can be seen in Figure 2. Notice the completeness and conciseness of the information retrieved from the database. Another excellent database for business searches is Microcomputer Index. While a relatively new database, it provides a subject and an abstract guide to microcomputer articles from 32 periodical sources, including such periodicals as *BYTE*, *InfoWorld*, *Interface Age*, *Creative Computing*, and *Desktop Computing*. As a specialized database, microcomputing serves a definite need and may be one of the fastest growing both in content and usage.

ACCESSION NUMBER	80-10002
TITLE	Effective Report Writing
AUTHORS	Ballard, Charles R.
SOURCE	Ohio CPA (OCPAA7,OCP), v39n2, PP.49-53, ISSN 0030-0837, Spring 1980
DOCUMENT TYPE	J (Journal Paper)
INDEX TERMS	Writing; Reports; Communication; Effectiveness; Accountants reports; Guidelines; Criteria
ABSTRACT	In report writing, the lack of facial expressions, body movements, and tone of voice must be overcome by clear, concise, and accurate presentations. Writing varies in formality with the occasion; there are differences in style and tone between financial statements, the president's letter, and the accountant's comment letter. Redundancy and improper or inferior construction which includes misspelled and misused words, bad grammar, jargon, and hackneyed phrases are among the common faults in accountants' writing.The writer should be concise, eliminating meaningless phrases that interrupt the smooth flow of thoughts. He should use the passive voice sparingly and wisely, and he should study books on effective writing. Sufficient time must be allowed when writing, and all reports must be reviewed.

Figure 2
Citation and Abstract from Orbit

SEARCH COSTS

On the average, a computer database search costs from $15 to $20, not including the searcher's salary or fee. However, there are numerous factors which could cause the cost to vary substantially. Some of these factors are on-line time, type and number of printouts, and nature of the topic. The major cost is on-line or computer connect time. For example, Dialog, an information retrieval service, charges $73 an hour for Inform connect time. If the searcher is familiar with the topic and has carefully chosen appropriate keywords for the search, the connect time can be kept to a minimum. Also, by having the citations or printouts printed off-line and mailed to him/her within a week, costs can be kept down. However, if the searcher needs the information immediately, it can be printed on-line and retrieved immediately; but, this feature generates a higher cost. One can also order the full text of most articles for between $6.50 and $10.00 each. Finally, the nature of the topic can also affect the search cost—the more general the topic the larger the number of citations and abstracts available. While the searcher determines the number of citations and abstracts desired, larger numbers found usually cause the searcher to ask for more citations.

ACCESS TO DATABASES

Most databases can be accessed through several means. The most common of these means are libraries, private industry, and subscription. Libraries, both college libraries and public libraries, often provide search services. In most cases, the user is not charged for the librarian's or searcher's time but is charged for connect time and printouts. Since computer search services are relatively new to most libraries, the search service may not be visible. Often the computer search room is in the basement, an emptied out closet, or some remote section of the library. Private industries often provide computer search services through computer departments or through company libraries. In these cases, the user is usually charged for overhead, along with connect time and printout charges. Databases can also be accessed from homes or offices using microcomputers by special subscription service. Even general databases, such as The Source and CompuServe, offer access to such business databases as Management Contents and Microcomputing Index. Dialog recently instigated a subscription service for Knowledge Index giving the user access to many of Dialog's databases during low evening usage times. BRS

has a similar service called BRS/After Dark. Access to numerous databases is both readily available and easy.

ADVANTAGES AND DISADVANTAGES OF DATABASES

The advantages of using databases are numerous. In addition to providing quick and easy access to information, the searcher has access to information sources not often available in the local library. The citations are also complete, which is highly unusual in manual searches unless the researcher has taken great care to ensure completeness. Some databases even provide code numbers on the printouts to help the researcher locate the matching code number on microfilms. This speeds up the search for the original. These advantages of time savings and improved quality of data collection procedures can greatly affect business decision making.

However, there are some disadvantages to computer searches. Not only does the researcher have to select the proper database but also the proper keywords. In addition, the person assigning keywords and abstracting the article is depended on to select appropriate wording. There is documented evidence that searchers do not always turn up all the information available on the topic selected. Searchers should still use manual searching methods when computer searches leave gaps. Presently, one of these gaps is current information. Some databases lag as much as six months behind actual publication. Another disadvantage in some cases is cost. The value of the information and the urgency of its collection should be determined before a database search is routinely undertaken.

SUMMARY

A database is a valuable new tool for the business researcher. It can provide the user with quick and easy access to information on general topics, as well as specific topics. One can access a database from offices, homes, libraries, or businesses with the aid of a computer. While there are over a thousand databases serving a variety of purposes, there are several databases very useful to business researchers. Among these are Inform, Management Contents, PsychInfo, Orbit, and Microcomputer Index. These databases collect information on both general and specific business topics. All provide the researcher with completely documented citations and abstracts. In most cases, the searcher can even order a copy of the

original document. However, there is a cost to using this service. While it usually averages between $15 and $20, the range is quite susbstantial depending on a variety of factors. Like any tool, using it properly and efficiently brings the most value.

•••

NOTES

1. George L. Belswinger, "Database Update," *Public Relations Journal*, (March, 1982), pp. 37-79.

2. Jason Birmingham and Betsy Gilbert, "Computers Investigate that Research Rapidly, Reliably," *Personal Computing*, (February, 1982), pp. 45-47+.

3. "Computer Articles Listed in Database," *Desktop Computing*, (August, 1982), p. 78.

4. *Directory of Online Databases*, published by Cuadra Associates, Inc., Ken Duzy, Editor, 1983.

5. Robert Donati, "Decision Analysis for Selecting Online Databases to Answer Business Questions: A Guide for Beginning Business Searchers and Non-Business Intermediates," *Database*, (December, 1981), pp. 49-63.

6. John Edwards, "Buyer's Guide to On-Line Information Services," *Desktop Computing*, (May, 1983), pp. 16-26.

7. Andrew Gale, "Computerized Research: An Advanced Tool," *Journal of Accountancy*, (January, 1982), pp. 73-84.

8. David James, "Data Bases Fulfill Needs on Demand," *Personal Computing*, (July, 1982), pp. 32-44.

9. Joanne Kelleher, "Getting the Information You Need," *Inc*, (January, 1982), pp. 83-84.

10. John Markoff, "DIALOG Offers New Data Bases," *InfoWorld*, (March 28, 1983), p. 1+.

11. John Markoff and Tom Shea, "In Focus: Information Utilities," *InfoWorld*, (March, 1983), pp. 41-51.

12. "Online Databases Show Growth Amid Changes," *Information Management*, (March, 1983), pp.15-16.

INTRODUCING DICTATION/WORD PROCESSING SYSTEMS IN BUSINESS WRITING CLASSES

Jeanne W. Halpern
Purdue University

AT THIS VERY MOMENT, a technological revolution is occuring which will dramatically change the way our students write—and the way we teach. The main headquarters of this revolution is an enclave known to readers of *Time* and *Newsweek* as Silicon Valley, a high technology area in California which includes the main offices of the Apple Corporation, Hewlett-Packard, Intel, Hwang and others. Subsidiary plants, branch offices, and distributors of these and other high technology companies are located throughout the United States and, indeed, throughout the world.

Like many revolutions, this one began quietly. Although we read in the late sixties about computers and electronic media—in books by Marshall McLuhan[1] and in professional publications by Edmund Farrell[2] and Edward P.J. Corbett[3]—we more or less overlooked these advance warnings. By 1980, however, the revolution was firmly entrenched; dictation/word processing systems had infiltrated every type of organization in the country. In the professions, doctors were dictating records of office visits; lawyers were dictating adaptations of computer-stored contracts and wills; and even college professors were dictating scholarly articles and books. In government, federal, state, and city agencies were producing many of their letters, memos, and reports on dictation/word processing systems. And in business and industry, the communications media were entirely transforming the production of written messages.[4]

It was, in fact, in one large corporation that I first encountered the revolution. At a workshop I was giving at a corporation in New York in 1980, I noticed memos and letters with the most peculiar sentence structures and organizational patterns I had ever seen. I soon learned that these communications had been dictated on the company's new centralized dictation/word processing system. When I asked what kind of training the users of this system had received, an executive said: "Oh, everybody here knows how to use telephones and tape recorders!"

Thus began my adventure with the new technology. Now, after several years of research, I can report that it takes more than "using telephones and tape recorders" to produce clear writing on the new systems. And I can also report that teachers of business writing have an enormous responsibility to teach students to use the new systems effectively.[5]

In the following pages, I will explain the problem which confronts our profession. Next, I will describe the effects the new communication systems have on the process of composing. Finally, I will address the challenges that the new technology holds for our profession and propose ways to meet these challenges.

PROBLEMS POSED BY THE NEW SYSTEMS

Although there has been an incredible revolution in communications over the past decade, most writers have not been adequately prepared for it. Survey after survey shows large and small organizations installing dictation/word processing systems. The same surveys, however, show that potential users are not making effective use of these systems.[6]

What explains this enormous gap between the potential usefulness of the new systems and the performance of those who use them? The answer is change. Although dictation, itself, has an incredibly long history, dictating on the new systems calls for new and unfamiliar composing strategies. For centuries, scribes have translated spoken words into writing as Tiro did when he took shorthand from Cicero, as Boswell did when he acted as Johnson's amanuensis, and as Dickens did in his job as court stenographer and later as parliamentary reporter for the London *Morning Chronicle*. Since the nineteenth century, stenographers have used the Pittman or Gregg shorthand systems to take dictation; in the twentieth century, secretaries transcribe either from shorthand or from recorded tapes. Each of these dictation systems has relied on a transcriber who knew the dictator; understood the context of the communication; and could check, correct, or add information as necessary. What is different in the new systems, which combine dictation with word processing, is the absence of personal contact between dictator and transcriptionist. The dictator can record a message wherever he or she happens to be—in an office, on a train, in a hotel—using a desk recorder, a pocket model, or a telephone. The taped message is then relayed to a round-the-clock word processing center and transcribed by a keyboard operator who may know nothing about the speaker, the context, or

the relevant files. The transcriptionist prepares the letters, reports, or forms, usually has them printed, and returns the printed versions to the dictator, either for signing or for revision. Although such systems are flexible and efficient, they make new demands on the writer, especially the writer who expects to produce letters to be signed and sent immediately. To use the new systems effectively, such writers must be taught to dictate a message which is entirely self-contained and which, though spoken, looks as though it had been written for a reader.

My research suggests that the main roadblock to effective dictation on the new systems is education. Although on-the-job writers may master the technical process—of using code numbers, spelling difficult words, and not eating apples while they dictate—they are *never* taught, either on the job or in our classes, to adapt the composing process of writing to systems which require that they speak writing. As teachers, we will have to know more about the systems our students will use and prepare them to use these systems effectively.

EFFECTS OF THE NEW SYSTEMS ON COMPOSING

After my experience at the workshop in New York, I began to read about the revolution I had inadvertantly discovered. I didn't find much, specifically, about composing on dictation systems. Barrie Van Dyke, in her discussion of the writing of high-level bank executives, had shown how and when these writers dictated their communications.[7] And John Gould at the IBM research center had conducted numerous laboratory experiments which compared writing and dictating.[8] Because of the scarcity of materials on the subject, I decided to investigate the revolution first-hand by designing a research project which would answer these three questions:

1. What kinds of materials do on-the-job writers compose on the new dication/word processing systems?
2. What characterizes the composing process of writers who use the new systems?
3. What should business writing teachers know about this process to prepare their students to use the new systems effectively?

To find the answers to these questions, I interviewed 28 users and managers of the new systems between June and December, 1980, conducting structured interviews, having my interviewees fill out questionnaires, and collecting and analyzing their notes, tapes, drafts, and final communications.[9] What did I find?

First, I learned that successful users of the new systems produce four kinds of communications:

1. First-time-final letters, memos, and reports;
2. Drafts;
3. Adapted form communications; and
4. Records of various kinds.

Dictators use the new systems most frequently to compose first-time-final and draft communications.

To answer my second question—"What characterizes the composing process of writers who use the new systems?"—I analyzed the materials I had collected, found that the composing process of dictation, like that of writing, includes three recursive stages: planning, dictating, and revising/editing/correcting. But, I also found that the substages of this process differ considerably in first-time-final and draft communications and that many writers have difficulties which stem from differences between the recursive writing process and the requirements of speaking writing. Perhaps the best way to illustrate the composing process of dictation is to present two case studies of successful users of the new systems.

Case 1: Bernard Galler, Dictating First-Time-Final Messages

In June, 1980, I interviewed Bernard Galler, editor of *The Annals of the History of Computing*. Galler explained that he often comes to his office at the University of Michigan Computing Center in the evening to dictate first-time-final letters. He plans each letter from the files before him, jots down a few notes, dictates, and makes "sure the tape of that letter has no errors before moving on to the next one." The following morning, the letters are on his desk. He checks, signs, and gives them to his secretary for mailing.

When Galler filled in his structured interview form and discussed his composing process with me, he described the stages he typically went through, which included planning, dictating, and correcting. During the planning stage, Galler said that he would:

- Consider audience, purpose, structure, and what the secretary needed in directions and documentation;
- Assemble all relevant materials and files; and
- Think through the subject carefully, making notes as necessary.

During the dictating phase, Galler said that he would:

- Dictate at his desk recorder, making very clear distinctions between the text of the letter and the directions for the secretary;

- Replay the dictation "to face up to what it's like to listen to;"
- Revise the tape by backing up over errors and dictating again.

He would then deliver the materials to his secretary for word processing. During the correcting stage, Galler would:

- Review the letters for errors and indicate corrections on a separate note; he said, "I occasionally let a minor awkward word or repetition go through, which differs from my typical habit in writing."
- Instruct the secretary to correct and send the letters.

Although Galler was unusually perceptive about the process he went through, he was not aware of certain features of this process: for example, that he averaged one pause or stop every seven words, *not* including directions to the typist, and that he paused frequently to plan his dictation. The process of first-time-final dictation appears to contain all the elements Galler listed *plus* frequent pausing to plan sentences, phrases, and words. It also tends to be recursive in nature, with the speaker reviewing and even revising the tape before moving ahead.

Lest you think this process is limited to the Galler example, let me assure you that the process was very similar in the five other first-time-final tapes I analyzed and that it was quite similar to the process involved in dictating adaptations of computer-stored forms and in dictating records.

Case 2: William Sonzonyi, Dictating Drafts

The second frequent use of dictation systems is for drafting long or complex letters or reports. I will illustrate this process by describing the dictation of William Sonzonyi, who frequently drafts, revises, and polishes his technical reports at the United States Great Lakes Basin Commission, where he is Research Administrator. In June, 1980, I interviewed Sonzonyi about a fairly detailed short report he had just completed, a report describing a sensitive regional meeting of the Commission. Sonzonyi had organized his brief meeting notes into a detailed outline, begun his dictation outdoors in a grassy field near his office building—to avoid the frequent interruptions that occured at work—and then finished the dictation in his office. After the dictation had come off the word processor, Sonzonyi revised the first draft "to cut out my natural wordiness," had the draft corrected on the word processor, and showed the second draft to his boss, who made several changes.

When Sonzonyi filled in his structured interview form and discussed his drafting with me, he described the following process, which again included three main stages. Clearly, Sonzonyi was aware of the planning stage, in which he:

- Jotted down some ideas;
- Thought about the ideas;
- Considered questions or interests of his readers;
- Revised and added details of his meeting notes;
- Developed an outline from his notes, rank ordered his inclusions to move from what was most important to least important to his readers;
- Assembled all necessary materials.

In discussing the dictation stage, Sonzonyi reported that he:

- Dictated, rarely stopping to correct, but stopping between paragraphs to plan, sometimes adding afterthoughts to be inserted in the correct position when revising the draft: "Dictating helps my fluency."

And finally, Sonzonyi described his revision and editing of drafts by saying that he:

- Edited the first draft for conciseness, clarity, and sentence structure—to make his writing short and to the point;
- Asked others to respond to the corrected second draft, made appropriate changes, and had the changes incorporated in the final copy;
- Proofread and corrected the final copy.

To illustrate how accurate Sonzonyi's perception of his preliminary planning was, I can tell you that his original notes included 7 lines and 19 words, while his expanded outline covered two pages with several hundred words. By the time Sonzonyi began dictating, he seemed to have his purpose, audience, organization, and content well in hand.

However, Sonzonyi's analysis of the dictation stage differed considerably from his actual performance. In his brief analysis, Sonzonyi noted that he stopped between paragraphs to plan and that dictation seemed to improve his fluency. Actually, he averaged one stop or pause every 5.5 words, not including directions to the typist, to plan not only paragraphs, but also sentences, phrases, and words. Sonzonyi dictated mainly in phrases, including speech-related rambling sentences and non-parallel structures, and he did *not* improve his fluency, except in the articulation of stock or repeated phrasings, such as "Great Lakes Research, Development and Monitoring." In fact, the tape sounded choppy.

Perhaps the most illuminating feature of Sonzonyi's dictated drafting, however, is the discrepancy between his description of the revising/editing stage and his actual practice. Although his perception from beginning to end was that his revision and editing improved "conciseness, clarity, and sentence structure," the first draft of the short report actually contained 646 words and the second 695 words, an *increase* of 49 words. Furthermore, the deletions and additions were mainly substantive; he did *not* edit his passive constructions, speech-related repetitions, or awkward phrases, all of which added words without meaning. Put another way, Sonzonyi did not really concentrate on improving style in his revisions, as he thought, but on improving content, confirming John Gould's observation that writers who dictate rarely revise their letters, memos, and reports for style.[10] Most of the stylistic changes in the final copy, in fact, resulted from the transcriptionist's questions and corrections or from suggestions by the second reader.

Dictated drafting, then, is characterized by more exploration, more ad hoc planning, and more collaboration during draft revision than first-time-final dictation. Futhermore, although all of my interviewees who drafted their communications claimed that drafting improved their fluency, the drafted tapes that I collected had *more* pauses—to plan sentences, phrases, and words—than the first-time-final messages. While dictators generally pause very frequently—apparently to plumb their memory for the syntactic and mechanical patterns of written prose—those who draft, pause most frequently—apparently to keep their detailed plans in mind while choosing phrases and words appropriate to writing. Finally, those who dictate drafts do not necessarily attend to stylistic considerations when they revise.

The obvious questions is, what does this elaborate analysis of on-the-job dictation have to do with teaching business writing to college students? As I have tried to show above, it has everything to do with teaching writing. Oral composing is what our students will be doing when they leave our classes. And few of them will be able to compose successful communications on the new dictation systems without adequate instruction. Since our responsibility is to prepare students to write well during—and especially after—college, we will have to inform ourselves about how our students will compose in the future and help them understand the differences between pen-in-hand composing and dictating for word processing.

CHALLENGES FOR TEACHERS

This brief review of my research has suggested seven features which distinguish pen-in-hand writing from dictated writing, features which, I believe, teachers should address in their classes. These features include:

1. **Making functional choices:** Teachers should prepare students to anticipate the options the new systems provide—for composing first-time-final communications, drafts, new versions of computer-stored forms, and records—so that students can make appropriate composing choices for the option they choose.
2. **Adapting for dual audiences:** Teachers should prepare students to conduct concurrent monologues, one for the intended reader, and one for the transcriptionist who types the word-processed text. If one or the other is inadequate, a dictated message will fail.
3. **Using highly-adaptable planning strategies:** Teachers should introduce a wide range of planning strategies—from generative heuristics which allow students to explore and plan drafts of complex communications to stereotypic patterning procedures which are more appropriate to adaptations of stored forms.
4. **Relying in special ways on memory:** Teachers should help students internalize the conventions of written texts—including format, syntactic patterns appropriate to writing, and mechanical conventions. Because those who dictate must consistently translate spoken words into written form, students will have to remember how printed texts look and how written sentences *differ* from spoken sentences.
5. **Incorporating oral delivery skills:** Teachers should provide consistent in-class opportunities for students to use notes to present information orally to other class members or to record, revise, transcribe, and edit dictated communications.
6. **Using highly adaptable review/revision procedures:** Teachers should encourage students to revise in many ways. If tape recorders are available, students can practise auditory revision on tape. When revising on paper, students should be encouraged to improve the style of their sentences. (My research has shown that, because of the heavy emphasis on planning, revision in dictation is less a matter of discovery or reformulation than of improvement of content. Since those who dictate routinely attend to factual content, they must be taught to focus on the style of written sentences when they revise their dictated tapes or printed drafts.)
7. **Collaborating with people and equipment:** Teachers should emphasize collaboration in all stages of the composing process and, when

possible, give students opportunities to use electronic composing media.

Suggestions of this kind are likely to provoke several questions from writing teachers: How can I possibly *do* these things in my business writing classes—which are now overflowing with essential assignments? Why bother? Isn't teaching about the new communication systems really the responsibility of on-the-job training programs?

WAYS TO PREPARE STUDENTS

Preparing students for the new dictation systems need not require a great deal of classroom time. Since many teachers of business communication now regularly include units on oral presentation in their classes, they can easily address the main issues associated with dictation within the context of oral composing.[11] In this connection, they could introduce information about the distinctive features of the new systems and about the distinctive features of *composing* on these systems. For example, in our business writing classes at Purdue University, Sarah Liggett and I developed a two-week unit in which we taught students to plan effectively for dictating first-time-final communications. In a controlled experiment which tested the effectiveness of this unit, we found that those students who had learned effective planning strategies, as well as the technical aspects of dictation, produced significantly better memos than those who had learned only the technical aspects.[12] Other teachers, such as Flatley and Vik at San Diego State University, have also developed units of varying lengths to introduce students to the new dication/word processing systems.[13] And recent work on technical communication by Tebeaux at Texas A and M suggests that dictation is also being incorporated in technical writing classes.[14] There is little question that teachers who want to prepare students for technological change can find many efficient ways to do it within the context of current writing classes.

The big question is, of course, why bother? I have tried earlier in this chapter to convey a sense of the pervasive communications revolution that surrounds our profession. It is clear that our students need highly transferable, cognitive strategies and writing skills to confront this revolution. While it may be easier to say, "Let Ma Bell do it, or let General Motors do it, or let IBM do it," my own consulting experience suggest that these organizations know virtually nothing about the professional gains we have made over the past decade in understanding composing, in teaching rhetorical strategies, and in defining styles of business writing.

Teachers are the only ones who can help students compose well-written documents, no matter which new systems they use in the future. Our students need versatile strategies they can use—in a hand-written love letter or in a dictated feasibility report. And, we are the only people who can teach these strategies effectively.

I would like to conclude with a quotation from Walter Ong, describing a change which occurred over 2000 years ago because of a technological revolution comparable to the one occuring right now. Ong describes the change in classical rhetoric when writing transformed a previously oral culture:[15]

> Now when you spoke. . . you were obliged to sound a little bit like writing quite regularly or perhaps even always. . . . You were expected to let your speech be colored by the way writing was or could be done. . . . After writing, oral speech was never the same.

I contend that as a result of the new communications technology, neither speaking *nor* writing will every be quite the same. We live in a period of technological change as revolutionary as the period Ong described. We ought to prepare ourselves—and our students—to meet the challenge.

•••

NOTES

1. Marshall McLuhan, *Understanding Media: The Extensions of Man*, (McGraw Hill, New York, 1965), and McLuhan and Quentin Fiore, *The Medium is the Massage*, (Bantam Books, New York, 1967).
2. Edmund Farrell, *English, Education, and the Electronic Revolution*, (National Council of Teachers of English, Urbana, Illinois, 1967).
3. Edward P.J. Corbett, "What is Being Revised?" *College Composition and Communication*, Vol. 18, (October, 1967), pp. 167-172.
4. Among recent descriptions of this transformation, see: Lester Faigley and Thomas P. Miller, "What We Learn from Writing on the Job," *College English*, Vol. 44, (October, 1982), p. 561; Howard Gardner, "On Becoming a Dictator," *Psychology Today*, Vol. 14, (December, 1980), pp. 14-15, 19; Louis H. Mertes, "Doing Your Office Over Electronically," *Harvard Business Review*, Vol. 59, (March-April, 1981), p. 34; Betty R. Ricks, "The Neglected Managerial Communication Skills," *ABCA Bulletin*, Vol. 44, (December, 1981), p. 25;

and, C.E. Zoerner, Jr., "A Survey of the Great Dictators," *ABCA Bulletin*, Vol. 44, (March, 1981), pp. 7-9.

5. For fuller descriptions of the research described in this chapter, see: Jeanne W. Halpern and Sarah Liggett, *Paper Voices: Effects of Technological Change on Writing*, (University of Southern Illinois Press and the National Council of Teachers of English, Carbondale, forthcoming); and Jeanne W. Halpern, "Are Dictation/Word Processing Systems Changing Business Writing?" in *People and Information: The Intermix for Successful Communication*, (Proceedings, 1981 ABCA National Convention), ed. Arthur B. Smith (American Business Communication Association, Urbana, Illinois, 1981), pp. 194-206.

6. See, for example, "WPS Measures Dictation Usage," *Word Processing Systems*, Vol. 44, (February, 1980), p. 22.

7. Barrie Van Dyke, "On-the-job Writing of High Level Business Executives: Implications for College Teaching," unpublished paper presented at the Conference of College Composition and Communication, Washington, D.C., March, 1980.

8. John Gould, "Experiments on Composing Letters," in *Cognitive Processes in Writing*, ed. L.W. Gregg and C.R. Steinberg (Lawrence Earlbaum, Hillside, New Jersey, 1980), pp. 97-127.

9. This research was funded by the Purdue Reseach Foundation, West Lafayette, Indiana. For a detailed description of interview and analysis procedures, see ERIC document ED 203 318, 1981, pp. 1-31.

10. Gould, *op. cit.*, p. 103.

11. Donald Payne, "Integrating Oral and Written Business Communication," in *Exploring Speaking-Writing Relationships: Comparisons and Contrasts*, ed. Barry Kroll and Roberta J. Vann (National Council of Teachers of English, Urbana, Illinois, 1981), pp. 183-197.

12. The dictation unit is described in Sarah Liggett, "Preparing Students for a New Mode of Business Communication: Dictation for Word Processing Systems," in *People and Information*, pp. 207-219. The unit and the experiment are described in detail in Liggett's "Preparing Business Writing Students to Use Dictation Systems: An Experimental Study," Doctoral Dissertation, Purdue University, 1982; and in Halpern and Liggett, *Paper Voices*, Chapter 3.

13. Marie Flatley and Gretchen Vik, "Incorporating Oral Communication and Dictation Skills in Business Writing Classes," in *Teaching Business Writing: Approaches, Plans, Pedagogy, Research*, ed. Jeanne W. Halpern (American Business Communication Association, Urbana, Illinois, 1983), pp. 130-146. On the need for such training, see also, in the same text, Herbert W. Hildebrandt, "Societal and

Technological Change: Two Challenges for Research and Teaching," pp. 200-213.

14. Elizabeth Tebeaux, "Keeping Technical Writing Relevant (Or, How to Become a Dictator)," *College English*, Vol. 45, (February, 1983), pp. 174-183.

15. Walter Ong, *Interfaces of the Word: Studies in the Evolution of Consciousness and Culture*, (Cornell University Press, Ithaca, New York, 1977), p. 87.

AUDIO TELECONFERENCING: A PRACTICAL EXPERIENCE

Richard J. Knecht
The University of Toledo

THE PURPOSE OF THIS ARTICLE is to demonstrate how the typical classroom, utilizing lecture and discussion, can be transformed into an "interactive communication setting"[1] via teleconferencing. Although the technology of teleconferencing has been available for almost two decades, it has not been widely publicized or utilized by either industry or higher education until recently.

Several reasons come to mind as to why potential users have been reluctant to include teleconferencing in the classroom or business meeting. One reason is that prospective users were afraid to employ teleconferencing (up to now) because they were unfamiliar with the state of the art or anticipated a foul-up of equipment that would prevent them from achieving their projected goals. Generally speaking, these fears are unfounded; if one is capable of placing a long-distance call via a WATS number, then he or she should be able to successfully place a teleconference call. A second reason is that educators and managers imagine that teleconferencing would not have the impact of the model lecture or the typical interpersonal business meeting.

These misconceptions have no real substance and have been gradually disappearing because of the efforts of such organizations as the Center for Interactive Programs at the University of Wisconsin and the various manufacturers of teleconferencing equipment in this country and abroad. A study published last year by *Telcoms* concluded that the application of teleconferencing was expanding in such areas as business, higher education, and in the medical profession both nationally and internationally.[2]

A factor contributing to the broader application of teleconferencing would seem to be the variety and diversity of methods that have become available. The systems, to mention a few, now include slow scan, freeze frame, and, of course, audio teleconferencing.

Slow-scan video is the least expensive method of visual teleconferencing. Two telephone lines are needed for transmission—one for voice and another for the video image. Although it takes the camera approximately 60 seconds to scan an image, the system is able to offer visual and audio interaction to participants in different locations.[3]

Freeze frame video permits a single frame to freeze and then to be transmitted blurfree to a distant location. Although the picture is better than that of the slow-scan, the participant must still wait patiently for the picture.[4]

Audio teleconferencing is, of course, the least expensive and most familiar form of teleconferencing. It requires nothing more sophisticated than a telephone and/or speaker phone.

This last method, audio teleconferencing, was the one used by The University of Toledo and seven other schools in seven different states when exploring how telecommunications policy is formulated in this country. Ten minutes prior to the actual teleconference, each location was instructed to dial an operator at an assigned number who completed the conference call or "bridge" with the other participants.

Specifically, the individual teleconferences covered the following topics:

1. Deregulation of Cable and Broadcasting
2. New Era in Common Carrier
3. Spectrum Management: Enough Space?
4. What is the U.S. Role in International Communications?
5. Electronic Information and Publishing
6. Competition and Ownership of Telecommunication
7. Future of Public Telecommunication
8. Legislative Status Report

The issue addressed in each of the teleconferences seemed to be clothed in an atmosphere of deregulation. Advocating a rewrite of the Communications Act of 1934, examining the consequences of the AT&T breakup, and exploring America's posture in international telecommunications, as well as predicting the future in each of the eight policy issues, was a revelation for students and moderators alike.

Merrick Communications, the consultants for the teleconference, furnished the moderator at each site with a packet of suggested readings, an annotated bibliography, possible research topics for participants, and recommendations for tying various topics together so that individual sessions would become, as it were, the pieces of a telecommunications policy mosaic. Of course, this was only possible because of the advance planning on the part of Merrick Communications and that of the individual moderator at each location who either had a graduate degree in broadcast regulation, a law degree, or, in one instance, had served as a former Federal Communications Commission member.

Moderators and participants agreed that each session of the teleconference would adhere to the following format:

1. **Warm-up.** For a 15-minute period prior to the actual teleconference, students at each school would be allowed to ask questions of their moderator. These questions might be in regard to the clarification of unfamiliar cases, or terminology, or why the determiners of telecommunication policy advocated the position they did. Hopefully, the questions that would be asked of guests in Washington, D.C., would be formulated during this 15-minute period.

2. **Introduction.** The actual teleconference would begin by having the Director for the Center for Telecommunications Studies at George Washington University introduce either two or three guests who served as representative spokespersons for the government or private industry.

3. **A Stand on the Issue.** Each speaker was then allowed from three to five minutes to state why he or she took the position on a particular issue and whether they believed that the status quo should be maintained or that a much needed change should be introduced into the political arena.

4. **Question and Answer.** Next, each of the eight sites would be able to ask a question of one of the speakers. In order to insure fairness, it was decided at the onset that questioning would be done in a round-robin fashion. If an answer needed clarification, then a participant would be allowed a follow-up question. This procedure continued for the next 70 minutes when the teleconference would end with a summation from the host.

5. **Follow-up in Toledo.** After the teleconference segment ended, a guest speaker from the Toledo metropolitan area was invited to elaborate upon the information and viewpoints that had been expressed in the preceeding meeting. Guests who were invited included the legal counsel for the local cable company when the deregulation of cable was discussed; an executive from Ohio Bell who discussed the topic of common carriers and, more specifically, on the break-up of AT&T; and, finally, the vice-president of the public radio and television station who spoke about the effects of the budget cutbacks that were being enforced and those that were projected when the future of public telecommunications was the topic of the teleconference. The net result of the segment designated as a follow-up in Toledo provided reinforcement of what was said at the national level.

Favorable feedback from students at the graduate and undergraduate level was almost immediate. The teleconference sessions made it possible for the participants in Oklahoma, Florida, Iowa, Michigan, Alabama, Ohio, and New York to simultaneously hear the comments on governmental officials, industry representatives, and lobbyists from various pressure groups and to question

for themselves the reasons why the spokespersons took the position that they did. In essence, students learned how the decisions being made on telecommunications policy would affect them in the future.

The typical classroom setting of lecture and discussion could not have been an adequate substitute for the dynamics of the give-and-take process of teleconferencing. However, that is not to say that there is anything wrong with good traditional classroom teaching; but, given the opportunity, why not make the subject matter better by making it as current as possible?

The success of a course using teleconferencing as its nucleus seems to depend upon two major factors: (1) a dedication on the part of the teacher or moderator to convince participants that this type of electronic meeting can accomplish more effectively, and with greater impact, the goals of the traditional classroom, and (2) accepting the fact that teleconferencing, in one form or another—voice, audio graphic, freeze frame, or full motion—has arrived and is no longer the technology of the future but is commonly used today in both government and industry settings to promote better communication.

•••

NOTES

1. The phrase seemed to be broad enough so that it could include the dynamics of teleconferencing and was used by me during the lecture segment of the seminar, Telecommunications Policy, Fall Quarter, 1982.
2. Lorne A. Parker and Christine Olgren, "CIP Releases New Teleconferencing Study," *Telcoms*, Vol. V, No. 1, (January, 1982), p.8.
3. Greg Paulsen, "The View from VideoNet," *Video Systems*, Vol. 8, No. 4, (April, 1982), p. 19.
4. *Ibid.*, p. 20.

THE TECHNOLOGY OF WORD PROCESSING

Zane K. Quible
Oklahoma State University

IN 1964 WHEN ULRICH STEINHELPER, a German IBM office products manager, invented a new concept called "textverabetung," it is not likely that he could have accurately predicted the impact of his creative efforts. His invention, which today is commonly known as word processing, has revolutionized many of the procedures used in preparing written business communications.

In less than 20 years, revenues from the sale of word processing equipment have reached the multi-billion dollar mark. It was recently predicted that by 1986, worldwide revenues from the word processing industry would reach $10 billion.[1] Of the specific devices used in word processing systems, International Data Corporation recently predicted that the most significant growth will be in the area of electronic typewriters. According to IDC, the annual compounded growth rate for these devices will be 28 percent; and, the revenues from this one segment of the word processing equipment industry is projected to reach $1.1 billion in 1986.[2]

The distinguishing characteristic of word processing equipment is its ability to capture and store keyboard material on such external magnetic storage media as magnetic cards, disks, and tape, or on an internal storage medium. The ability to store material is desirable for a variety of reasons. Material can be more easily revised and edited because only those changed portions have to be rekeyboarded. The storage capability of the equipment saves a considerable amount of employee time since the unchanged portions of a document do not have to be rekeyboarded. Further, the magnetic medium is used to prepare the desired number of additional copies of the material. Thus, material has to be keyboarded only one time when preparing multiple original copies. This feature is especially attractive for use in preparing form letters.

THE WORD PROCESSING CONCEPT: AN OVERVIEW

The use of word processing in preparing written business communications is efficient because of the specialized equipment that is

used and the design of employees' jobs. This specialized equipment results in the conservation of much employee time and effort because of the ability of the equipment to capture and store material as it is being keyboarded.

Employees' jobs are more efficiently designed because of the principle of division of labor that is used widely in word processing. The traditional secretarial job is split into two basic functional parts: (1) keyboarding and related functions, and (2) all other functions performed by secretaries. Employees perform one or the other of the functions—but not both. The keyboarding is performed by word processing operators who also perform other related tasks, such as proofreading. Administrative secretaries perform all other tasks found in traditional secretarial jobs, in addition to a few new tasks. For example, administrative secretaries may assume an increased role in conducting research, in tabulating data, and in other areas for executives for whom they work.

In the early days of word processing, it was common for organizations to install one large center in which all word processing operators worked. The centralized structure created a few human-relations problems that organizations have overcome by installing several small distributed centers strategically located throughout the premises. The decentralized approach continues to be used widely.

CATEGORIES OF WORD PROCESSING EQUIPMENT

At the present, four broad categories of word processing equipment are available. These categories include electronic typewriters, standalone text-editors, integrated word processing systems, and multiterminal word processing systems. The characteristics of the equipment found in each category vary widely.

Electronic Typewriters

Found at the low-cost end of word processing equipment, electronic typewriters are being used in an increasing number of word processing systems. These devices range in cost from $1,200 to $6,000, which is considerably less than the cost of some of the devices in the other equipment categories.

Unlike other equipment, most electronic typewriters do not have a removable magnetic medium for permanent storage of keyboarded material. Consequently, when the magnetic medium is filled to

capacity, earlier-keyboarded material is automatically erased to make room for new material. Although the amount of storage capacity varies from one brand of machine to another, some devices will store up to 100 pages of material.

Some brands of electronic typewriters can be upgraded, which increases their functional capabilities. One of the upgradeable features available on some electronic typewriters is the addition of electronic components that accomodate such removable magnetic media as floppy disks or magnetic cards. This permits the permanent external storage of keyboarded material.

Increasingly, electronic typewriters are equipped with an LED screen that displays one line of about 20 characters. The last 20 or so characters that have been keyboarded appear on the screen. Once a character passes all the way through the screen, it is printed on paper. The character buffering provided by the LED screen enables the operator to correct errors before they are printed, provided they are corrected while they still appear on the screen. Many of the devices found in the other equipment categories use a CRT screen display rather than the one-line LED display. The display capabilities of CRT screens range from a partial page to two full pages of material.

Stand-alone Text-editors

The original text-editor developed by Steinhelper in 1964—the IBM MT/ST (Magnetic Tape/Selectric Typewriter)—fits into the stand-alone category. Because stand-alone devices are self-contained, they are not dependent on other types of equipment, such as a computer, to be operable.

Stand-alone devices are classified as either nondisplay or display. Although nondisplay devices are still available, no equipment manufacturers are known to be developing new models. When compared with display devices, nondisplay machines are considerably less efficient because material is printed on paper as it is keyboarded. On most brands of equipment, the first draft becomes unusable because it contains strikeovers resulting from the correction of errors. Further, the inability of stand-alone devices to accomodate simultaneous keyboarding and printing decreases their efficiency.

Display devices are considerably more efficient than nondisplay devices because of the screen feature. As material is keyboarded, it first appears on the CRT screen which enables the first paper copy of the material to be a usable copy. The efficiency of display devices

is further enhanced because it is possible to keyboard material while the printer is operating.

Stand-alone devices, which range in price from around $6,000 to approximately $20,000, have several components, including the keyboard and CRT screen, the magnetic medium storage unit (such as a disk drive), and a printer. Some stand-alone devices are capable of communicating with a variety of other types of equipment by sending over telephone lines the electronic signals that represent alphabetic, numeric, and symbolic characters. This capability is known as electronic mail.

Integrated Word Processing Systems

The base of integrated word processing systems is data processing equipment that is capable of performing word processing functions. Three levels of data processing equipment are used in integrated word processing systems: terminals and printers attached to the mainframe of a computer, minicomputer-based systems, and personal computers. Of the three alternatives, the later two levels are the more common.

In a minicomputer-based system, the software that enables the equipment to function as a text-editor is stored within the minicomputer. Keyboarded material can be stored either internally in the minicomputer's primary storage unit or externally in a peripheral storage device. Most minicomputer-based integrated systems support several terminals.

One of the advantages of integrated systems is the availability of equipment capable of performing both data processing and word processing functions. Although the equipment can perform dual functions, it can perform only one of these functions at one time. Consequently, it is not possible to manipulate stored data, which is primarily a data processing function, while the machine is being operated in word processing mode. Most of the major data processing equipment manufacturers have word processing software available for use in enabling minicomputers to perform word processing functions.

Personal computers are found at the low-cost end of integrated word processing systems. A variety of word processing software packages are available that enable personal computers to operate as stand-alone text-editors. The word processing software is stored on a floppy disk that must be loaded into the personal computer whenever the operator wishes to use the device as a text-editor. Keyboarded material can be permanently stored on a removable magnetic medium, most commonly floppy disks.

The price of most brands of personal computers makes them especially attractive for use as a home-based text-editor. Personal computers with word processing capabilities can now be purchased for less than $3,000.

Multi-terminal Word Processing Systems

The basic difference between multi-terminal systems and integrated systems is in the type of equipment that is used. Multi-terminal systems use equipment capable of performing only word processing functions, while integrated systems use data processing equipment capable of functioning as text-editors. Another difference is in the number of terminals that can be used in the system. Multi-terminal systems support two or more workstation devices while some integrated systems, such as a personal-computer-based system, can support only one terminal.

Two classifications of multi-terminal systems are available: shared resource and shared logic. The differences between the two classifications are becoming less distinct as some brands of equipment now possess characteristics found in both classifications.

Shared-resource systems use stand-alone terminals that possess their own intelligence. Therefore, the terminals are not dependent on other host devices to be operable. Consequently, if a portion of the system fails, the remainder of the system will still be operable. The various terminals that comprise the shared-resource system will likely share a printer and possibly peripheral data storage devices.

The terminals in shared-logic systems cannot stand alone; they are dependent on a host central processing unit. Since the terminals do not possess their own intelligence, the entire system becomes inoperable when the host equipment is inoperable.

The cost of multi-terminal systems range from approximately $20,000 to $100,000. The number of workstation terminals that can be attached varies quite widely among the brands of equipment, but most systems will support at least three or four terminals.

Equipment Usage

The Administrative Management Society reported in the April, 1982, issue of *Management World* the results of a study it conducted to determine the extent to which the various types of word processing equipment are used.[3] The survey group was comprised of AMS

members employed in more than 140 cities in the United States and Canada. As the results in Table 1 show, more than half of the respondents reported that the organizations in which they are employed use both stand-alone display and electronic typewriters, and nearly a third reported the use of shared-resource and shared-logic devices.

Table 1
Percent of Organizations in Which Equipment is Found

Category	%
Stand-alone display equipment	59
Electronic typewriters	54
Shared-logic and shared-resource devices	30
Data processing equipment with word processing capabilities	28
Personal computer with word processing software	17

SOURCE: Adapted from Table 1, *Management World*, April, 1982, p. 14.

OTHER TYPES OF EQUIPMENT USED IN WORD PROCESSING SYSTEMS

In addition to text-editing devices, a variety of other types of equipment is used in word processing systems. Included are such devices as dictation equipment, facsimile devices, and optical character recognition readers. These devices are discussed in greater detail in other articles in this publication, so only a brief description of each is provided in this articles.

Dictation Equipment

One way to maximize the efficiency of word processing is to use dictation equipment for the input of material into the system. Once word originators develop good dictation skills, they are able to dictate up to four times faster than they can handwrite routine

correspondence.[4] This gives them more time to carry out other job duties. In addition, the unit cost of their written work decreases because they actually spend less time creating written business communication.

The use of a centralized dictation system maximizes the efficiency of a word processing installation. When a centralized system is available, the dictation that employees originate is simultaneously recorded in the word processing center where it will be keyboarded.

Several different brands of centralized dictation systems are available. Some brands require the use of a special dictation microphone while other brands use the telephone handset as a microphone.

The use of a telephone-based dictation system provides the distinct advantage of being available 24 hours a day regardless of one's location (provided one has access to a telephone). Consequently, originators are able to use the system when they are at home at night and when they are out of town on a business trip.

It is also possible to use desk-top and portable dictation units in word processing systems, although their use is not as convenient nor as efficient as centralized systems. The magnetic medium on which the dictation is recorded has to be physically carried to the word processing center.

Facsimile

Although facsimile has been available for more than a hundred years, its current popularity is a rather recent phenomenon. Facsimile is used to transmit information from one location to another through such channels as telephone lines.

The facsimile device at the sending location reads the information on the paper copy that has been inserted on its drum and encodes this information into electronic codes that are transmittable. The facsimile unit at the receiving end decodes these electronic codes back into their original format and prepares an identical paper copy. Facsimile devices are capable of transmitting a page of material in approximately 30 seconds.

To transmit material via facsimile, an employee at the sending location dials the telephone number of the recipient. Once the connection has been made, the telephone handsets at both locations are attached to the telephone coupler on each facsimile device. Transmission begins once the machines are activated.

Optical Character Recognition

In many instances, it is desirable for an organization to convert information contained on paper into electronic format to facilitate permanent storage. Two alternatives are available: (1) keyboard this information so it can be manually inputted into the organization's electronic storage system; or (2) input the information into the system through an optical-character recognition (OCR) process. The later is a much faster, more efficient alternative.

Now available are OCR readers capable of reading approximately 10,000 characters per minute. These new readers have a near-100 percent accuracy performance rate.

OCR is used by organizations mostly to input material of an external origin into their electronic information storage system. Once the information is in the system, it can be used in a variety of ways. This information can be easily accessed for inclusion in another document, it can be easily accessed for reference purposes, and it can be revised and edited using a text-editor.

FUNCTIONAL CAPABILITIES OF WORD PROCESSING EQUIPMENT

The equipment used in word processing systems is capable of performing a number of fairly standard functions. In addition to these standard functions, some equipment are capable of performing a number of other nonstandard functions. These additional functions are classified as nonstandard because they are not found on all brands of equipment.

Most of the standard and nonstandard functions that the equipment performs are either automatic or semiautomatic. Automatic functions are performed without operator assistance, while the semiautomatic functions often require only minimal operator assistance. Whether a specific function is automatic or semiautomatic is determined by the brand of equipment and the software that the equipment uses.

Standard Functions

Among the standard functions found on word processing equipment are the following:

Insert. After material has been keyboarded, additional material

can be easily inserted. This is done by "opening a window" for the new material and then inserting it in the "window" by means of the keyboarding process. All of the original-keyboarded material that follows the inserted material automatically "floats downward" on the page to make room for the new material. After the material has been inserted, the "window is closed," and the machine automatically justifies to assure balanced line endings.

Delete. The process of deleting a character, a space, a word, a sentence, a paragraph, or a page is easy on word processing equipment. On most devices, this is done by depressing a key or two on the keyboard. The machine automatically closes in the space voids and rejustifies the material.

Center. To center lines on dedicated word processing equipment, the appropriate "center" key is depressed before keyboarding the material to be centered. On other equipment capable of performing word processing functions, a keyboard command is used. As the material is keyboarded, it is automatically centered by the machine.

Underlining. Devices used for word processing are capable of automatically underlining material. The machine, which uses either an underline function key or a keyboard command, automatically underlines the material during the printing process.

Automatic wraparound. Another standard feature on equipment is automatic wraparound. If a whole word will not fit at the end of a line, the machine automatically "wraps" the entire word around to the beginning of the next line. Although this feature eliminates the need for dividing words, it may result in a somewhat ragged right-hand margin.

Justification. The automatic justification feature on word processing equipment is used in several ways. When material is inserted into or deleted from material that has already been keyboarded, the justification feature is used to balance line endings. It is also used to change the line size of a document after it has been keyboarded. For example, if a 60-space line was used in the original keyboarding of the document and a 70-space line is desired later, the machine will automatically adjust the material to fit a 70-space line. The justification feature is also used when a justified (even) right-hand margin is desired.

Automatic decimal alignment. When keyboarding numerical data in tabular format, it is not necessary to align the material in a perfect vertical line in relation to the decimals. The machine will make adjustments automatically, which results in a perfect vertical alignment of the decimals that appear in the numbers.

Automatic pagination. Although perhaps not as standard as the

features discussed above, most word processing equipment automatically paginates material. Therefore, the operator need not be concerned about how much more material will fit on a page. The machine automatically starts a new page when the predetermined maximum amount of material that will fit on a page has been reached. Before final printing, the operator may need to make some manual adjustments to avoid having widow lines either at the top or bottom of a page.

Nonstandard Features

Among the nonstandard features found on word processing equipment are the following:

Block move and copy. A useful function found on word processing equipment is block move and copy. This function eliminates having to rekeyboard material for use in a document when that material has already been keyboarded for another document. The desired material is accessed; and, when given the appropriate directions, the machine will insert this material at the desired place in another document. This function is most commonly used for preparing letters, contracts, and proposals that contain standard material.

Global search and replace. When an originator wishes to replace one word with another word—either universally throughout a document or in selected locations—the global search and replace function is used. The machine will locate each occurence of the word in the document. Most devices will give the operator the choice of replacing the word with the new one or of leaving the original word in the document. The new word only has to be keyboarded one time. The use of keyboard commands will automatically insert the word at each desired location.

Merge. The merge function is especially useful for organizations that often prepare original form letters with small amounts of personalized information. The names and addresses of the recipients are stored on one magnetic file, and the body of the letter is stored on another file. The equipment automatically merges the two. On most equipment, it is possible to insert variable material in the body of each letter. This material is likely to be stored on the name-address file. Depending on the brand of equipment, it may be possible to sort the name-address file on the basis of some predetermined variable, such as zip codes. Letters are then prepared only for those persons whose zip code fits into the predetermined category.

Headers and footers. On some equipment, a header and footer func-

tion is available. An example of the use of this function is the automatic numbering of pages of a document during printout. Another example is the placement of a heading, such as "revenue forecast," at the top of each page of the document. Once the appropriate command is given to the machine, headers and footers are automatically inserted at the desired locations.

Footnotes. The footnote function automatically numbers and inserts footnotes in the proper sequence and on the appropriate page. Often when a document in which footnotes appear is heavily edited, footnotes will no longer apppear on the pages on which they were originally placed. This feature compensates for those kinds of changes.

Revision identification. To save proofreading time, the revision identification function highlights the changes in material so they can be easily spotted. This function eliminates having to re-proofread all the material several times.

Spelling verification. One of the most useful features now available on some word processing equipment is spelling verification. After a document has been keyboarded, this feature verifies the spelling of all the words in the document. Each word in the document that is not found in the dictionary is identified. The three common reasons tha words cannot be found are: (1) the word is misspelled; (2) the word is a proper noun and is not included in the dictionary; (3) the word, even though correctly spelled, is not in the dictionary. After the spelling verification process is completed, words that are not found are visually marked on the copy displayed on the screen. The operator can then correct the spelling or verify that the word is spelled correctly. Some spelling verification packages will provide on the screen the correct spelling of several words similar to the misspelled word. The correct version is inserted in either of two ways, depending on the package: either automatically or by manually keyboarding the correct version. Some of the dictionaries currently available hold as many as 100,000 words; others hold fewer words, but allow one to customize the dictionary by inserting additional words.

Glossary. In many organizations, certain words are commonly used in the material created by the originators. If a glossary is available, these common words can be stored in the system in coded form. When keyboarding material, a word is recalled and inserted simply by keyboarding the assigned code for the word.

A JOINT WORD PROCESSING-BUSINESS COMMUNICATION UNIT

An increasing number of colleges and universities are now offering courses designed to train students to use word processing equipment. In these institutions, it may be possible for instructors of word processing and business communication courses to develop a joint word processing-business communication unit. Such a unit benefits students in each course since both groups of students perform tasks that come fairly close to simulating the "real world."

The joint units works this way: the word processing students keyboard some of the assignments dictated by the business communication students. Greater realism can be achieved if the business communication students use dictation equipment and the word processing students use transcription equipment. Most colleges and universities that offer training on word processing equipment also have the dictation/transcription equipment available. A tape recorder can be used as a substitute, although its use is not nearly as effective as equipment specially designed for dictation and transcription purposes.

Another element of realism can be added if the students have an opportunity to revise a rough draft of the material they dictate. This gives business communication students an opportunity to use proofreader marks in a realistic way. And, the word processing students have a realistic opportunity to use the equipment for keyboarding changes in the material.

The following suggestions will enhance the effectiveness of a joint word processing-business communication unit:

1. Early in the unit, the business communication students should be familiarized with the word processing concept, including its history, the procedures used in a word processing system, equipment, and so forth.
2. The business communication students should be thoroughly instructed about appropriate dictation procedures and proper usage of dictation equipment. They should also have ample opportunity to develop these skills in practice sessions before they are expected to dictate material that will be keyboarded.
3. The business communication students should see word processing equipment in operation so they can fully appreciate its capabilities.

Business communication students can become more familiar with the word processing concept through the following learning activities:

1. Have students prepare either a formal or an informal report on some aspect of the word processing concept.
2. Have students talk with word processing equipment vendors about the various features of their equipment and then prepare an informal report about their findings.
3. Have students interview a manager of a word processing center and prepare a report on the interview results.
4. Have students prepare a written summary of the material presented by a guest speaker who discusses the word processing concept.

•••

NOTES

1. *Future Strategies in Office Automation*, (Martin Simpson Research Associates, New York, 1982).
2. *Office Automation Equipment Markets*, (International Data Corporation, Framingham, Massachusetts, 1982).
3. J. Long, "WP Survey: Who's Using What?," *Management World*, (April, 1982).
4. A. Rosen and R. Fielden, *Word Processing*, (Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1982).

TELECONFERENCING

N.L. Reinsch, Jr.
Oklahoma State University

ON MARCH 10, 1876, Alexander Graham Bell and Thomas A. Watson succeeded in transmitting recognizable speech through the first working model of the telephone. Shortly thereafter, the telephone was recognized as having implications for business. According to John Brooks, the first telephones were rented to business for use on May 1, 1877, to two young Boston bankers; by the end of the year, a rudimentary telephone exchange linked several Hartford, Connecticut physicians with the Capitol Avenue Drug Store.[1]

In subsequent years, as telephone systems were expanded, business organizations were frequent customers. AT&T reported that as of January, 1981, there were at least 508 (and perhaps as many as 524) million phones in service worldwide; the country with the largest number was the United States with approximately 191.6 million phones. In the United States, 27.8 percent of all phones were designated as business phones; in many other countries, more than 35 percent of all telephones were designated as business phones.[2]

Today, a variety of new communication technologies are becoming available which supplement or modify the telephone and permit new types of communication. Several of the new forms of communication have been labelled teleconferencing. While authorities do not agree on a single definition of teleconferencing, most do agree that various forms of teleconferencing play an important role in business communication and will be even more important in the future.

In this paper, the term "teleconferencing" is used to designate inter- or intra-organizational, mediated human communication which includes two-way (synchronous) voice contact. This definition is broader than some definitions. It includes both audio and audio/video conferencing (some writers have used teleconferencing as a label for only audio or only audio/video), and it includes conversations involving as few as two persons (some treatments have focused only on groups of three or more). On the other hand, the definition excludes computer conferencing (a form of communication regarded by some as teleconferencing). The definition used in this paper was selected

to identify a cohesive set of human communications, i.e., those to which human speech is central. The forms of communication included were all originally based on the telephone and most continue to depend on telephone technology and the telephone system.

This paper is intended to assist the business educator in understanding the nature and significance of teleconferencing. No attempt is made to provide an exhaustive account of either teleconferencing or practice—parts of the field are too new and changing too rapidly to permit such treatment. Instead, the emphasis is on a broad understanding of teleconferencing and its educational implications. The remainder of the paper is divided into three sections which are focused respectively on new teleconferencing technologies, the likely effects of the new technologies, and implications for business communication education.

NEW TELECONFERENCING TECHNOLOGIES

Almost everyone has participated in two-way, mediated voice communication by telephone. But, synchronous voice communication systems are being transformed and enhanced by a variety of technological advances. Some of the advances, such as electronic switching, network digitization, satellite relays, and fiber optics, are hidden from the user. But these and other innovations produce major and obvious changes in the way communication systems work.

The first area of change is in the area of special services. A variety of telephone services are already available. These include automatic dialing (a frequently dialed number can be dialed with only a few digits), automatic call transfer (incoming calls are switched to a different number while a person is away from his or her regular phone), call signalling (while participating in one call a person is signalled if someone else tries to call), repeat dialing (automatic dialing at regular intervals when a number is busy), and international direct distance dialing. Other special services will probably become available in the future. These services may include caller identification (recipient notified of number or location of call origin), and call refusal (any call from a specified telephone number would receive a busy signal). Taken as a whole, these services can make the telephone easier and more efficient to use. They also permit a person to custom design his or her personal telephone service.

A second change is the development of devices which permit visual information to be transmitted over conventional telephone circuits (or similar channels). A facsimile (or "fax") machine functions like

a copying machine except that the image of a graph, table, or photograph is converted to an electrical signal and the copy is produced slowly at a distant location by another facsimile machine. An "electronic blackboard" converts marks on a blackboard into electrical signals and produces the image on a distant television monitor. Various writing devices permit freehand handwriting or drawings to be transmitted and shown on a TV monitor or reproduced on paper. Slow scan (freeze frame or still frame) video transmits a series of still television pictures—charts and graphs can be effectively displayed but normal human movement appears jerky.

A third change is the possibility of adding full-motion, television-quality video. At present, full-motion requires a broadband channel, i.e., a signal many times more complex than what can be transmitted over a single conventional telephone circuit. The Bell system attempted to introduce a videophone in the early 70's. Bell's Picturephone® was not a success among private users because, in part, those who bought it first were going to find it useless (Who could you call?). But, video capacity is now being purchased and rented by organizations; and, they provide video service simultaneously to a complete network of communicators. Joseph N. Pelton conducted a Delphi survey of international communications experts. When asked to predict a date by which videoconferencing would be a significant share (10-25 percent) of total business communications in their countries, 13.2 percent said 1985, 67.5 percent said 2000, and 10.8 percent said 2015.[3]

A fourth change is the capacity to include more than two persons in a telephone conversation. By means of an amplified phone, several persons at a single location can speak into a microphone and listen to a loudspeaker and communicate with one or more persons at another location. A different (but, compatible) system is the conference call whereby persons at several different geographic locations may converse. The effect of these innovations is to increase the number of persons who may participate in a single call.

The fifth change is the availability of increasingly portable communication devices. Radio telephones have been available for some time; but, they have generally been conventionally-sized telephones or radios installed in cars or other vehicles and have had a restricted geographic range. A new technology, the cellular mobile telephone system, is now improving the quality of mobile communication service and greatly expanding geographic coverage. At this writing, the Federal Communications Commission is in the process of granting licenses to operate cellular mobile phone systems in many of the larger local markets. Future developments may include a national

or international radio net (perhaps using satellite relays) so that one's portable telephone could be used from any geographic location. Current developments already include personally-portable telephones; further miniaturization is likely to make it possible for a person to "wear" a telephone perhaps as small as a wristwatch.

These changes in communication systems permit many potential forms of teleconferencing; and, several forms have become or are becoming significant. Four types of teleconferencing will be designated here as audio, supplemented audio, video, and two-way audio/one-way video.

The most common example of *audio communication* is the ordinary phone call. This form of telecommunication is so familiar that its significance is sometimes overlooked. David W. Conrath collected data on 4,806 communication episodes in a single Canadian manufacturing plant; 526 (12.87 percent) were conducted by telephone rather than face-to-face or in writing.[4] Bertil Thorngren's summary of contacts between organizations and between regions in Europe focused only on telephone and face-to-face communications; but, in every case, the telephone contacts were approximately 80 percent of the total.[5] E.T. Klemmer and F.W. Snyder reported that workers in a research and development laboratory spent about seven percent of the work day talking on the telephone.[6] S.V. Volard and M.R. Davies analyzed records kept by Australian managers and concluded that six percent of the work day was spent on the telephone.[7] George T. Plotzke of AT&T has reported that American executives typically spend 16 percent of each working day on the phone.[8] It is clear that contemporary organizations rely heavily on two-way audio communication.

Supplemented audio communication frequently takes the form of an electronic meeting. A group of participants can use an amplified telephone to communicate with another group of persons or with key individuals. The audio communication is supplemented with a facsimile machine, an electronic blackboard, conventional printed materials, or some other visual medium. Such meetings permit widely scattered individuals or groups to participate in information exchange and decision making without the expense and inconvenience of travel. Despite the greater publicity given video teleconferencing, audio linking is still much less expensive and much more frequently used.

Video teleconferencing (i.e., two-way audio and video) was first implemented in the early 1960's; and, according to Richard C. Harkness, by 1982, approximately 80 U.S. organizations had at least experimented with it.[9] Video conferencing is especially suited for

meetings which require that participants be able to see each other. Video conferencing requires special equipment such as cameras and lights; and, it is relatively expensive. But, it does approximate face-to-face interaction more nearly than does audio conferencing. Each participant can assess the appearance of the other person. Participants can use some form of nonverbal communication, such as gestures and facial expressions; but, eye contact is hindered because to look at the eyes of your partner's television image requires that you look away from the camera which conveys your own image.

Two-way audio/one-way video teleconferencing seems especially suited for occasions when a visual presentation needs to be made to many widely separated groups. A video signal can be sent to each of many locations while less expensive audio channels provide feedback. Several manufacturers have used this technology to introduce new products to members of their nationwide sales staff. With this technology, the marketing department of a car manufacturer in Detroit can unveil new models to groups of car dealers gathered in various locations throughout the nation and answer questions phoned in by dealers.

It should not be assumed, however, that any form of teleconferencing is a perfect substitute for face-to-face interaction. Gene D. Fowler and Marilyn E. Wackerbarth have reviewed relevant research and concluded that various forms of audio teleconferencing can safely replace face-to-face contact for routine information exchange, discussion of ideas, solving problems, some negotiations, and some interviews; audio teleconferencing may not be as effective as face-to-face interaction when a task or problem is highly complex, the participants are not acquainted, or when conflict is present.[10] Research by John Short and his colleagues of the Communication Studies Group at University College in London indicates that certain communication behaviors (such as getting acquainted and dealing with conflict) are especially sensitive to variations in communication channel and may require face-to-face interaction. An estimate, admitted to be extremely tentative, is that about 40 percent of business meetings might be conducted by audio, and another one-fourth by video teleconference.[11]

There are, then, a number of technological developments taking place. These developments have provided new methods of teleconferencing and several of these methods are being used.

POSSIBLE EFFECTS OF NEW TECHNOLOGIES

The effects of any technology are hard to predict accurately. It is

usually much easier to focus on "supply side" issues (Can it be built?) rather than on "demand side" issues (Will anyone buy it?) and predictions of technological innovation may be distorted by supply side rhetoric. Robert Johansen, Kathleen J. Hansell and David Green have identified some of the "readiness factors" which, more than a decade ago, were mistakenly expected to produce an immediate, massive adoption of teleconferencing.[12] And, even if predictions of adoption are accurate, the effects of that adoption may not be easily foreseeable. Most dimensions of human life are interrelated so that a change at any one point may produce unforeseen effects at many other points. Communication technologies have, thus far in human history, generally proved to be "facilitators" rather than "causes." That is, technologies such as the telegraph, telephone, and radio did not produce direct and consistent effects but rather permitted a variety of effects depending on the goals of human users and other factors. Nevertheless, one can put forward, with varying degrees of certainty, expectations concerning the impacts of the changes in synchronous voice communication. These changes should contribute to at least five changes in human communication within businesses and organizations.

First, more efficient and effective communication technologies will probably increase the amount of voice communication, without necessarily decreasing other forms of communication. Most new communication technologies have not replaced older technologies but rather have increased the total amount of communication. John R. Pierce suggests, for example, that the telephone has not replaced travel, or books, but has partially replaced telegraphy.[13] In the future, some phone conversations may be absorbed by voice mail or other messaging systems. But, increasing travel costs and the capacity to easily contact persons and to include more individuals in the conversation are likely to yield a net increase of synchronous voice communication. According to Jeff Charles, the ability to "reach out" so as to allow "meetings that otherwise could not have been held," to open meetings "to people who could not travel to attend them," and to add "extra persons to a face-to-face meeting" is the rationale used by organizations to justify the purchase of teleconferencing systems.[14] Synchronous voice communication should play a larger role in future organizational communcations. Sales presentations, selection interviews, work appraisal sessions, customer relations, managerial meetings, and other functions will have serendipitous benefits for some (e.g., the physically handicapped).

Second, the new technologies should enhance individual mobility. That is, in some cases improved telecommunications will permit in-

creased travel. The new portable phones will permit a manager to check an assembly line, visit a warehouse, travel to a meeting, or play a round of golf, without being unavailable to colleagues. Increased availability will also permit individuals to participate in more oral communication by helping to eliminate those unsuccessful efforts at telephone communication which result in a series of notes that someone called. For those individuals whose jobs require both high mobility and high availability (e.g., some managers, sales representatives, etc.), the portable telephone will be a boon. At least for the foreseeable future, a video conference will require participants to go to specified locations where cameras and other equipment are available; but, the audio conference may include individuals who are geographically dispersed, away from their work stations, or even on the road.

Third, more decisions will be made by groups rather than by individuals. Because it will be easy to include all interested parties (and hard to justify excluding any interested parties), decisions will increasingly be made through oral discussion. Group decisions require more time, result in more commitment from group members, and may be either better or worse than individual decisions depending on the nature of the decision. Both the advantages and disadvantages of group decision making will accrue to organizations.

Fourth, there will be increased attention to issues of privacy and uninterrupted work time. The portable phone and resulting availability which will benefit some will be an irritant for those who look forward to leaving the phone at the office during vacation and for those who need uninterrupted work periods and who do not have a receptionist to screen calls. These problems will provide additional impetus for development of special services designed to selectively screen users from certain calls or callers. Technology will be harnessed to produce either increased or decreased availability depending on individual preference and task responsibilities. The individual who wishes to "miss" a teleconference may arrange for his or her line to be "busy" throughout the scheduled time period.

Fifth, the new technologies make oral communication skills even more important. Felipe Korzenny argues that the level of communication skill affects the complexity of information which can be communicated through any particular channel; and, the narrower the channel, the greater the required level of skill.[15] In other words, it requires more skill to effectively communicate a particular message through a video conference than in a face-to-face meeting, and even more skill to communicate the same message by audio conference. So, as teleconferencing becomes more frequent or replaces some face-

to-face meetings, the participants will need enhanced communication skills. Skills such as question asking, listening, problem solving,discussion leadership, articulateness, and oral delivery will be important. The ability to speak a foreign language will be important to those who function in international environments. One can wait to have a letter translated; but, a phone call requires a fluent speaker (unless computer technology someday provides immediate translation). Perhaps even more important will be those skills with special relevance to the new environment, such as the processes of getting acquainted and managing conflict. Since persons will sometimes engage in these activities by telephone or videophone, the communication skills involved in these processes will be especially important. Another skill of obvious importance will be the capacity to adapt to a variety of communication situations (conference call, video conference, face-to-face) and to demonstrate oral communicative competence in each. The successful man or woman in the organization of the future will need to be an individual who is sensitive to differences in communication channels and adaptable enough to function competently in many or all of them.

EDUCATIONAL IMPLICATIONS FOR BUSINESS COMMUNICATION

The new technologies and the effects of those technologies on organizational communication require an educational response. In this section, some proposals for business communication are delineated. The focus is on changes in educational content rather than method. Four implications are noted.

The first implication is that students need to be educated concerning the effects of mediated communication. In some cases, we have naively assumed that mediated communication is identical to face-to-face interaction. This assumption is especially obvious as it relates to the ordinary telephone. Since almost everyone seems to be able to use the phone, it is assumed that the phone is adequately understood and that executives and other persons can rely on common sense to make wise decisions. The telephone is assumed but not explained; used, but not studied. It has, in a sense, become invisible. John Short and his colleagues have written:

> Unlike most of our other technological playthings, the telephone is actually interposed in the communication network between people, between groups and between organizations. . . . Yet we have accepted the interposition. . . of a mechanical

> device, which may alter the form or nature of our communications in various unidentified ways, without as much as a second thought.[16]

Only the development of more sophisticated and less familiar forms of telecommunication has awakened us to the possible effects of communication media.

Research, some of which[17] has been previously noted, indicates that mediated communication differs from face-to-face communication in several ways. There is some evidence, for example, that the outcome of teleconference negotiation is likely to differ from face-to-face negotiation. Ian E. Morley and Geoffrey M. Stephenson report that in negotiations the side with the objectively stronger case seems more likely to win in a telephone meeting rather than in a face-to-face meeting. This may occur because special pleading is not as easy without facial and postural communication.[18] Telecommunication can also provide a participant with new information or resources. One consultant who believes in the special effectiveness of video conferencing is Carmine Santandrea.

> At first encounter Carmine Santandrea seems harmless enough. And then he begins to explain why teleconference is better than live encounter.
>
> "Nothing can be as good as what we're doing. Face to face, right? But how often are you in a meeting and the speaker's over there and you're over here. Thirty feet apart. But the TV camera comes in really tight on the speaker's head." At this point Mr. Santandrea. . . crawls across the desk to its edge, and peers into each listener's eye—literally four inches eyeball-to-eyeball—and whispers "and you see him real good."[19]

There is no reason why video conference could not, through skillful camera work, instant replays, and "freeze frames," provide a participant with much more visual information than is available to the unaided eye. Being able to review and contemplate your opponent's micromomentary facial expressions during a negotiation session might be quite advantageous.

In short, students need to be educated in the dynamics of teleconferencing. If an American executive now spends 16 percent of each working day talking on the telephone, and will engage in frequent teleconferencing by the year 2000, then students who anticipate careers in business should be aware of the resources and limitations of teleconferencing.

A second implication is that students need additional training in oral communication skills. In general, it seems to require less skill to achieve a successful outcome in a face-to-face meeting than to achieve the same result in a teleconference. To the extent, then, that

more communication is electronically mediated, participants will need enhanced communication skills. Training might be provided in interviewing, oral presentations, group discussion, and listening. Such training should be adapted to fit telecommunication as well as the face-to-face arena. For example, much of the training material (from Bell and other sources) on how to conduct a teleconference stresses the need for an advance agenda, a strong chairman, self identification before speaking, a preview and review, and other techniques which amount to a directive style of group management. If this material is correct, students do not need a modern course in "group dynamics" (and emergent leadership) but do need a crash course such as was offered some years ago under the title "group leadership." Further research may suggest, as does the work of John Carey,[20] that a directive style is not always necessary in teleconferencing. But, the difference of emphasis between the training literature and some contemporary courses in group dynamics does point up the need to adapt communication skill training so that it will be applicable to telecommunications.

There may also be a need to extend oral communication training to include additional topics. The communication skills relevant to relationship initiation and conflict management may prove especially important since relationship initiation and conflict management are sensitive to channel bandwidth. Ways of coping with information overload and stress will be relevant to the degree that new telecommunication devices increase an individual's accessibility to others. Increased reliance on audio or video conferencing will also generate greater interest in enunciation, vocal quality, appearance, physical movement, and other delivery skills.

The third implication to be noted concerns apprehension. Some individual fear communication and, consequently, either avoid communication encounters or communicate ineffectively. There is an extensive literature demonstrating the prevalence and significance of speech apprehension and communication apprehension.[21] It seems intuitively likely that some individuals will be very concerned about "being on TV" even if it is only a two-way video arrangement. But, only a few scholars seem to have considered the possibility that individuals may experience heightened apprehension when required to communicate by telephone or videophone.[22] If research indicates that a significant percentage of the populace does suffer from apprehension which impairs telecommunication, then it might be helpful to identify and aid students so impaired.

A final implication is that students should be given training in making communication management decisions. In the past, men and

women could accept the communication environment as a fixed entity providing a limited number of options (face-to-face, phone call, business letter, memorandum). In the future, members of organizations will be called upon to help answer organizational questions such as, "Should we provide all first line managers with portable phones?" and personal questions such as, "Should I discuss this matter with my supervisor by phone, videophone, or face-to-face?" The number of potential communication options has increased greatly and this confronts the modern organization with a number of important and difficult decisions. Each organization can now create its own communication environment. Universities can help individuals make intelligent choices about personal and organizational communication systems by providing students with information, analytical abilities, and appropriate values.

These four implications suggest a subtle but profound adjustment in business communication education. It will not suffice to confine the telephone to a course in secretarial skills and to be content with the recommendation to "put a smile in your voice." Professionals in every business discipline need an accurate understanding of telecommunications. If the curriculum is to reflect human communication behavior in organizations, the curriculum must give more attention to communication technology in general, and teleconferencing in particular.

The needed educational adjustment can be approached in several ways. Special courses or course units might be developed in the social impact of the telephone, mediated interpersonal communication, teleconferencing, communication management, or appropriate communication skills. Much can be achieved through methods which are simpler but still provide valuable information or experience. Five specific suggestions are identified below.

1. An amplified telephone can be used to "bring" a guest speaker into a classroom. This will provide students with one sort of teleconferencing experience and acquaint them directly with the feelings of teleconference "listeners." This is also an inexpensive way to expose students to well-known experts. (But, not all experts are good teleconference leaders.)

2. In a class where students make oral reports, those reports can, with the use of an amplified telephone, be presented by teleconference. A student required to present his or her oral report by telephone learns a lot about leading a teleconference.

3. If students participate in group discussions, some of those discussions can be conducted by conference call. An instructor can "observe" such a discussion unobtrusively since his or her

"presence" is not readily apparent. Small groups of student may also participate in conference calls with guest experts. Perhaps several students might be asked to arrange a conference with the author or authors of the course text in order to clarify or gain information about specific issues.

4. If students conduct selection, appraisal, counseling, or sales interviews, some interviews can be conducted by telephone.

5. Case studies which focus on or include communication management issues could be developed. These would encourage student research on relevant topics and provide experience in decision making.

The five suggestions offered above are relatively inexpensive methods of beginning to train students in teleconferencing. Instructors who have access to sophisticated communication labs and video equipment will be able to provide students with more elaborate experiences.

Educators should begin immediately to prepare for the future. The telephone on your desk may look the same; but, POTS (plain old telephone service) is a thing of the past. The phone on your desk is one harbinger of the communications revolution.

•••

NOTES

1. *Telephone: The First Hundred Years*, (New York: Harper and Row, Publishers, 1976), pp. 53; 65.

2. *The World's Telephones, A Statistical Compilation as of January, 1981*, (Morris Plains, N.J.: AT&T Long Lines, 1982), pp. 1;12; 27-30.

3. "The Future of Telecommunications: A Delphi Survey," *Journal of Communication*, Vol. 31, No. 1 (1981), p. 181.

4. "Communications Environment and Its Relationship to Organizational Structure,"*Management Science*, Vol. 20 (1973), p. 598.

5. "Silent Actors: Communication Networks for Development," in *The Social Impact of the Telephone*, ed. Ithiel de Sola Pool (Cambridge, Massachusetts: MIT Press, 1977), p. 380.

6. "Measurement of Time Spent Communicating," *Journal of Communication*, Vol. 22 (1972), p. 149.

7. "Communication Patterns of Managers," *Journal of Business Communication*, Vol. 19, No. 1 (1982), p. 45.

8. "New Technology Creates 'the Office of the Future'," *Management Review*, Vol. 71, No. 2 (1982), p. 45.

9. "Teleconferencing, A Key Subsystem in the Office-of-the-Future," AFIPS Office Automation Conference, San Francisco, April 7, 1982.

10. "Audio Teleconferencing versus Face-to-Face Conferencing: A Synthesis of the Literature," *Western Journal of Speech Communication*, Vol. 44 (1980), pp. 236-252.

11. John Short, Ederyn Williams, and Bruce Christie, *The Social Psychology of Telecommunications*, (London: John Wiley & Sons, Ltd., 1976), p. 163.

12. "Growth in Teleconferencing: Looking Beyond the Rhetoric of Readiness," *Telecommunications Policy*, Vol. 5 (1981), pp. 289-295.

13. "The Telephone and Society in the Past 100 Years," in *The Social Impact of the Telephones*, ed. Ithiel de Sola Pool (Cambridge, Massachusetts: MIT Press, 1977), pp. 164-167.

14. "Approaches to Teleconferencing Justification: Towards a General Model," *Telecommunication Policy*, Vol. 5 (1981), p. 301.

15. "A Theory of Electronic Propinquity: Mediated Communication in Organizations," *Communication Research*, Vol. 5 (1978), pp. 3-24.

16. *The Social Impact of the Telephone, op. cit.*, p. 1.

17. Fowler and Wackerbarth, "Audio Teleconferencing"; Short et al., *The Social Impact of the Telephone, op. cit.*

18. "Interpersonal and Inter-Party Exchange: A Laboratory Simulation of an Industrial Negotiation at the Plant Level," *British Journal of Psychology*, Vol. 60 (1969), pp. 543-545; "Formality in Experimental Negotiations: A Validation Study," *British Journal of Psychology*, Vol. 61 (1970), pp. 383-384.

19. "Face to Face with Teleconferencing," *Training World*, Vol. 8, No. 5, pp. 20; 41.

20. "Interaction Patterns in Audio Teleconferencing," *Telecommunication Policy*, Vol. 5 (1981), pp. 304-314.

21. See, for example, James C. McCroskey, "Oral Communication Apprehension: A Summary of Recent Theory and Research," *Human Communication Research*, Vol. 4 (1977), pp. 78-96; James C. McCroskey and Virginia P. Richmond, "The Impact of Communication Apprehension on Individuals in Organizations," *Communication Quarterly*, Vol. 27, No. 3 (1979), pp. 55-61.

22. Monroe C. Steele and N.L. Reinsch, Jr., "Measuring Telephone Apprehension," International Communication Association Convention, Dallas, May 30, 1983.

Electronic Mail
How Will It Change Office Communication?
How Can Managers Use it Effectively?

Judith Stein
Yale School of Organization and Management
JoAnne Yates
Massachusetts Institute of Technology

WITH THE EXCEPTION OF MODERN PHOTOCOPIERS, the technologies of office communication, as we know it today, all came into use between 1876 and World War I. The development, during that period, of the telephone, typewriter, and interoffice mail system revolutionized internal communication in American businesses. The 1980s may be witnessing another major communication revolution—an electronic one centering on computer technology. Word processors already have been widely accepted for their capacity to speed the production of documents; but, they do not alter the traditional delivery system. By integrating production and delivery, electronic mail promises to reshape the communication system and style in many organizations.

Managers will have to understand the mechanics and characteristics of this new medium if they are to use it effectively—to avoid its pitfalls and exploit its advantages. And, those who teach communication skills must be prepared to train them.

WHAT IS ELECTRONIC MAIL?

Most commonly, *electronic mail* refers to systems on which the messages are normally composed at the terminal; transmitted electronically; read by the receiver, usually at a later time, on a terminal; possibly answered; and erased or filed electronically for future reference. This definition excludes electronic communication systems that routinely produce paper documents at either the sending or receiving ends, systems in which messages are transcribed by a secretary or in which someone other than the intended recipient screens incoming messages, and systems intended primarily for

simultaneous use by sender and receiver (although "chatting" may occasionally occur in electronic mail systems).

We may best describe electronic mail by defining its functions: a user of electronic mail may write, read, route, and store documents. Because systems vary enormously in hardware and software, the detailed workings of these functions will also vary.

Write. The write function generally includes two types of commands: *compose* and *answer*. To *compose* a message, the user must begin by providing heading information, that is, by specifying sender, receiver, and copy list, as well as subject line. The writer then composes and edits the message directly on the terminal. This process differs from other modes of writing (by hand, typewriter, or word processor) primarily in the clumsiness of editing on most electronic mail systems. The user has neither the cut-and-paste option of paper nor the ability to manipulate text easily and rapidly as provided by a good word processor. The *answer* function enables the user to respond to a message just read without specifying heading material and without exiting from one mode (*read*) and entering another (*compose*). The system automatically records address and subject information from the heading of the message just received. Otherwise, *answer* works much the same as *compose*.

Read. Included in this function are two types of commands: *read* and *scan*. With either command, the system provides a list (by subject line and length) of messages that arrived after the user last looked in his or her mailbox or a list of previously filed messages. The user may choose among the messages or review them all. *Read* displays an entire message either screen by screen or by scrolling the text. *Scan* allows the user to skim through waiting messages, viewing only the subject lines and 1-5 lines of text.

Route and Store. These two functions tell the system what to do with the document just composed or read. After composing the message, the writer may *file* it for later use or *send* it directly to the recipient and, automatically, to the copy list. He or she may also retain a personal (electronic) file copy. Once a document has been read, the receiver must either *file* it or *erase* it. Filing systems may be indexed in many ways; and, the files may be private or public, depending on the system. Filed documents may be retrieved, usually by date, sender, or subject line, for reading or scanning. Erasing a document, like throwing it away, does not eliminate copies held in electronic form in someone else's file.

WHAT ARE THE CHARACTERISTICS AND USES OF ELECTRONIC MAIL?

As a result of its multiple capabilities, electronic mail systems are fast and unmediated. These characteristics shape the way in which the systems are perceived and used.

Electronic mail speeds up the metabolism of organizations. By avoiding secretarial typing and interoffice mail delays, it gets written messages to their receivers rapidly without mediation by another person. Electronic mail also saves time by eliminating unproductive attempts to reach another person by telephone ("telephone tag") and by transmitting brief messages to familiar coworkers without the socializing that almost inevitably accompanies a telephone call. Further, the *answer* command makes it easy; and, a receiver will likely respond to a message immediately after receiving it.

These characteristics have led many users to view the system as an informal mode of communication used to deal with time-sensitive material that would otherwise be transmitted by telephone. However, as one user wryly stated in reviewing his electronic mail for the day, no one could possibly make or receive that many phone calls.

In fact, patterns indicate that electronic mail messages replace many more formal and longer communications, as well. In one organization, where everyone is on the system, users estimated that as many as 80% of the typed memos are now replaced by electronic messages. In another organization, it was found that only the most formal internal communications were being sent on paper; fewer than 55% of the messages occupied a single screen while fully 25% were over two screens long.

Preliminary evidence suggests that electronic mail replaces very few face-to-face meetings. It does, however, allow ongoing consultation and dialogue among people who might not otherwise communicate frequently because they are geographically dispersed. People who used to meet once a month still do so; but, in between meetings, they stay in touch through electronic mail.

Thus, electronic mail may replace a wide range of communications, from informal to formal, and initiate exchanges that might not otherwise take place. Users of electronic mail suggest that it has created a new style of communication that falls between a telephone call and a memo in both formality and detail of explanation. What results is a message that is less formal and less inhibited in style than a traditional communication but more structured than a phone call. This evolving form certainly has advantages for the writer, if not for the reader.

WHAT ARE THE POTENTIAL PITFALLS OF ELECTRONIC MAIL?

The informality, combined with the speed and lack of mediation inherent in electronic mail, invites misuse that may, if it goes uncorrected, interfere with the medium's usefulness.

Unfortunately, as a new medium of communication, electronic mail lacks conventions to distinguish between its various uses. The standard heading form on most systems combines with the technology to eliminate nuances of formality indicated by traditional headings, stationery, and form of message (typed or handwritten). Any variations of formality must be indicated by style, structure, tone and polish.

To complicate this problem further, the speed of the mode, its perceived informality, and its frequently poor editing facilities encourage a user to send out first drafts without due consideration to logical structure and grammar, as well as to tone. This carelessness can lead to serious or time consuming misunderstandings. Several users have needed to stop an electronic exchange and schedule a person-to-person meeting to smooth ruffled feathers created by inappropriate tone and language. In a crude attempt to overcome potential misunderstandings, writers sometimes interject asides such as "ha-ha," an approach that is clearly appropriate only in the most informal exchanges. Less serious, but time consuming, was one exchange in which a user, attempting to arrange a meeting, mistyped the name of a participant. It took four messages, among three users, to correctly establish the identity of the individual to be included.

The speed inherent in the system also increases the potential for inappropriate response. As one user commented, you cannot put your hand into the mailbox to retrieve a note sent off in the heat of anger or without adequate forethought. The *answer* is particularly open to misuse in this respect.

In addition, since the *answer* command typically retains the copy list of the original message for its response, inappropriate or irresponsible copying is encouraged. Exchanges can go back and forth with little thought to who needs the information or, worse yet, to what political consequences may ensue from sending a particular person a copy.

The ease with which communications can be sent to any number of users invites a related problem, proliferation of "for your information" mail. Some users regularly empty their files by sending copies of everything in them to all their subordinates. While keeping

people informed is valuable, up to a point, communications that are not useful are simply junk mail.

The stylistic problems of informality are compounded by the screen size of most CRTs. Since the typical screen holds only 24 lines of text, while the typical page of type holds 54, electronic messages must be even more concise and carefully structured than typed messages. The psychological barrier of turning the page is roughly equivalent to the barrier of proceeding past the first screen. The *scan* command further complicates the issue. If the first few lines of a document show nothing of interest, that document may be filed for later reading or summarily erased.

Thus, the characteristics of electronic mail, which seem so congenial to the writer, may present increased headaches for the reader. Since at some time we are all both writers and readers, everyone suffers.

WHAT DOES THIS MEAN FOR TRAINING POTENTIAL USERS?

What does all of this mean for training prospective users to communicate effectively through electronic mail? Users must learn to consider the reader's need for any given message; to distinguish between the various levels of formality and use them appropriately; to structure their material with screen length and scanning capability in mind; to highlight this structure for the reader's benefit; to resist the temptation to send out an important or controversial message without careful consideration and revision; and, finally, to use to their advantage the unique opportunities electronic mail offers.

To curb junk mail and to avoid inappropriate copying of ongoing electronic discussion, users must be trained to consider their purpose in writing and to think about the reader's needs before sending a message. Writers should, of course, always monitor their communications in this way. But, they must be particularly careful when using a system that encourages irresponsible copying.

As they write, users must vary the level of formality according to audience and context. In the absence of other cues, the ability to indicate formality by tone, language, and organization will be even more important in electronic mail than in traditional methods of communication. While an informal message to a good friend might start out with "Well, Joe, I finally met with the guys upstairs.", a more formal recommendation might start, "Based on a meeting with division management, I recommend that we shift four of our analysts

onto the new project for the next month." Although the fast and unmediated system encourages the former style, its appropriateness depends on the writer's purpose and relationship with the readers.

Although electronic mail may ultimately make communication in organizations less formal in tone, it will increase the need for careful structuring and highlighting as people expect to read more in less time. If users do not respond to this need, electronic mail may decrease, rather than increase, productivity. Given the size of the screen and the nature of the scanning function, as well as the general difficulty of reading on a screen, users must now, more than ever, structure their material with the reader in mind. Writers who have counted on the reader's willingness to read to the end or to flip to the last page of a report for the main point will find themselves losing their audience. They must learn to think of one screen as they now think of one page and keep in mind the difficulty of flipping to the end of the message. Putting the main point at the beginning of most communications will become crucial.

Once they have organized the material, users must consider how best to highlight their points. Until systems allow on-screen underlining and bullet points, other conventions, old and still-to-be-discovered, must serve that function. And, when using lists, writers must remember that the small screen will limit what the reader sees at one time. Thus lists need to be abbreviated in order to be useful. New formatting techniques suited to the small screen will have to be developed.

Users must also resist the urge to *send* or *answer* a message as soon as they write it, especially if it is relatively formal or controversial. A proposal for a new program should be well organized, effectively argued, clear, concise, grammatical, and free of typographical errors. The writer cannot sit down at his or her terminal, type out a first draft, and send it. Such communication requires forethought and revision. Just as a writer should set aside the first paper draft of a piece before revising it, the electronic mail user should establish a "cooling" file to hold drafts awaiting final revision and drafts of any heated responses. Similarly, the *answer* command should be used with care. Sometimes a message might better be answered at the writer's leisure than immediately on receiving it.

As this discussion indicates, electronic mail, with its features of speed and informality, and with the constraints created by hardware, exacerbates many of the problems endemic to much management writing.

However, in spite of the fact that manager will have to be more careful in using electronic mail than in using more traditional means

of communication, the medium offers unique opportunities to improve the quality, as well as to increase the quantity and speed, of communication in organizations. Ongoing dialogues, if responsible and thoughtful, can build concensus on issues quickly. Electronic mail also enables a user to draft an important communication and circulate it easily among colleagues to get their comments before revising it. Users should be trained to take advantage of such opportunities to improve the quality of their decision making and their communication.

Thus, the potential usefulness of electronic mail is most exciting. The challenge to those of us concerned with management communication will be to help users understand both the benefits and the dangers inherent in the systems and to show them ways to overcome the latter.

•••

NOTES

In writing this paper, we drew primarily upon interviews with users of electronic mail in several organizations and on review of electronic mail files. We are especially grateful for the time and effort expended by managers in the Office Systems Group at Digital Equipment Corporation. They graciously reviewed their electronic mail files with us and shared the results of work they had done. We were fortunate to draw, as well, on conversations with Marvin Sirbu, at MIT's Center for Policy Analysis, and Chris Bullen, at MIT's Center for Information Systems Research, both of whom are involved in research on electronic mail. We also benefited from a study done by Tom Mueller and John Hickman, graduate students at MIT's Sloan School of Management, on the electronic mail system used by MIT's Industrial Liaison Program.

TELECOMMUTING

Alfred B. Williams
University of Southwestern Louisiana

AS A CONSEQUENCE OF ADVANCEMENTS in telecommunication, a new cottage industry has emerged—an industry based on information processing where white collar workers perform their duties at home using personal computers connected to a central unit at the main office. This electronic cottage, as it is sometimes referred, is discussed as an alternative pattern of work by Alvin Toffler in *The Third Wave*. Toffler states, "The skyrocketing cost of gasoline and plummeting costs of minicomputers and communications suggest that at some point it will be far cheaper to put electronic work stations in the home rather than to transport vast numbers of workers back and forth every day."[1]

WHAT IS IT?

Some say telecommuting is an art; some say not! What it is, is a fairly simple concept of transmitting information over distance via electronic equipment rather than transporting the individual to a central office. Instead of the employee commuting to work, he or she works at home using telecommunication equipment and "commutes" the information. This is made possible by the microprocessing industry designing equipment which is affordable and convenient for home use. "The device may be a terminal with a printer or CRT, a word processor or a computer. It may have such features as electronic mail, teleconferencing, access to corporate data bases or remote time sharing. The principle is the same: easy access to information regardless of where the worker or the information is located."[2] Underlying such a telecommuting program is a management philosophy based on trust. Both the company and the employee must develop a working relationship with trust as the foundation. As a result, motivation and loyalty may be fostered.[3]

Researcher John Nilles of the University of Southern California, who coined the term "telecommuting" in the 1970's when trying to

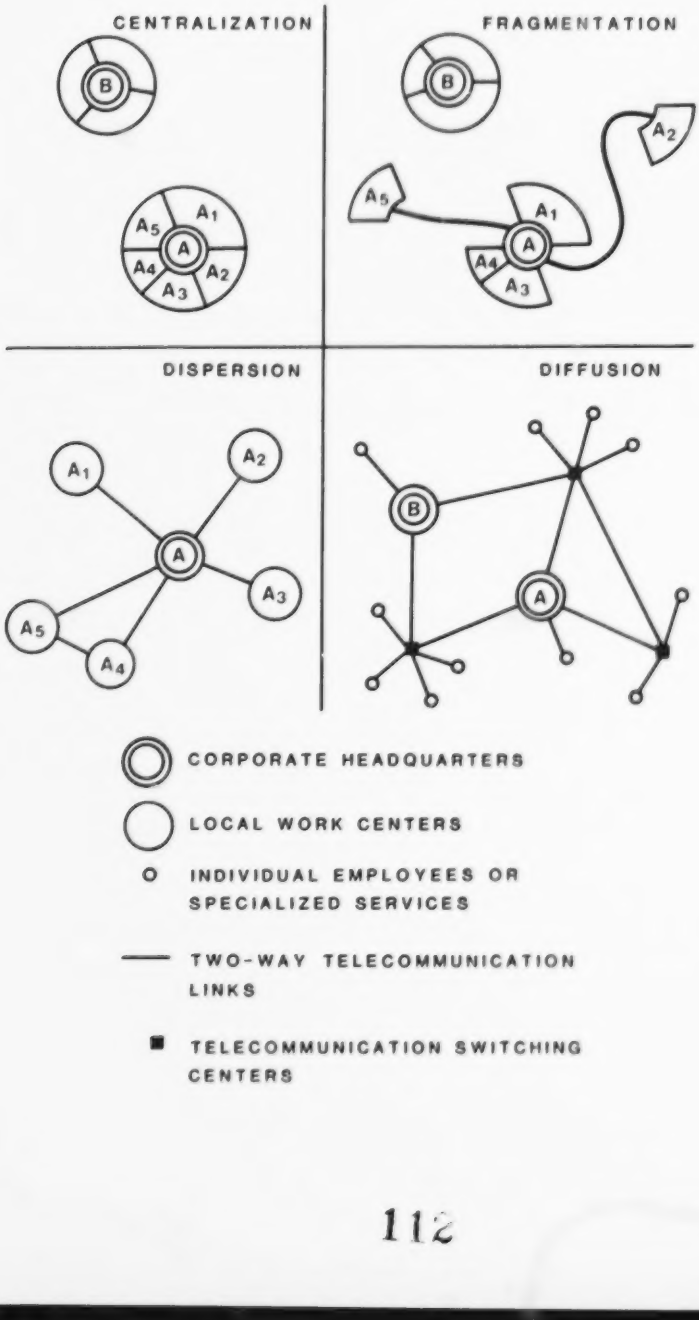
figure out the potential cost and energy savings that companies could achieve by decentralizing work operations, has weighed the costs of office space, commuting, and home equipment and predicted that within a decade five million people could be working mainly at home. "By 1990, an estimated 47 million people will be in the information jobs in the United States. Maybe two million to five million of those people will be telecommuting to some degree."[4] Given the capabilities brought about by the microcomputer industry to produce, transmit and store information, those in the information industry could perform their work at home.

Teleworkers or telecommuters, as they are called, are in the vanguard of the third century of industrial advance. The first industrial century, from 1776 to 1876, was based on the transportation revolution of steam power and the railroads. The second century, 1876 to 1976, was based on the transportation revolution of the assembly line and the automobile. The third century, from 1976 to 2076, is based on the transportation revolution of information through telecommunication channels.[5]

THE DECENTRALIZED PROCESS

While telework, the use of computers as a primary communications tool in the workplace, can be conducted from a centralized location just as easily as from a decentralized one, telecommuting implies decentralization. Telework could be conducted in the privacy of one's home or at regional work centers near the concentration of workers' residences. Nilles et al in 1976 identified four evolutionary patterns.[6] Figure 1 illustrates the patterns of decentralization. The first phase, *centralization*, has a single, large headquarters and everyone must commute there. The *fragmentation* pattern has coherent subunits breaking off and locating elsewhere i.e. the electronic suburb. Computer departments, for example, need not be physically housed where the main office is located as information processes are being done via terminals and transmitted. Fragmentation generally results in an increase in commuting. The third phase is *dispersion*. A number of work centers are located around the urban area and an employee reports to the nearest one. Telecommunications and computers tie the various departments together. Such arrangements results in the so-called electronic village or the electronic neighborhood. In the fourth phase, *diffusion*, neighborhood work centers or working at home (sometimes called Alternate Work Sites) becomes the norm.

Figure 1
Patterns of Decentralization



WHAT ARE THE REWARDS?

Decentralization of the office may result in some rewards to those who telecommute. In addition to the time and energy saved by not having to commute to work, opportunities abound for those who are confined or feel confined to the home. Handicapped individuals and working mothers would benefit from the opportunity to work at home. This would free them to devote their time to being productive and economically self-sufficient. A renewed sense of worth would emerge. The tapping of such a labor pool would enable industry to capitalize on the special capabilities of the homebound. The flexibility of time and place is an added convenience resulting from telecommuting. Being able to work at home will reduce the need for extensive office space at the centralized headquarters. Such a reduction will save money and help to reduce overhead operating expenses for heating and cooling. Not having to drive or carpool, take the subway or the bus, will result in fuel reduction. Nilles says that such energy-saving measures will improve the quality of life. Less time will be spent in traffic jams, there will be less air pollution and less need for expanding roads and parking facilities. A probable slowdown in the purchase of automobiles (there may be less need for two cars while less wear and tear may prolong the life of a car) could result. Mass transit cost will be reduced as fewer people will be commuting. There will be a tax benefit to those who work at home as the IRS allows special deductions for space devoted to business purposes. As a consequence of being able to work at home, telecommuters will have more flexibility in the choice of where they live. It will be convenient to live in areas where real estate values are reasonable as proximity to the office will no longer be a consideration. Based on the results of companies who have experimented with telecommuting, there is an increase in productivity derived from the many advantages mentioned above.

WHAT ARE THE PROBLEMS?

Advantages notwithstanding, there are barriers to telecommuting. By far the most serious is the deprivation of interaction with coworkers. There is a sense of companionship and togetherness among workers which telecommuting denies. Coworkers give us support and the incentive we need to do our jobs. In turn our focus often shifts from ourselves to those around us. Studs Terkel claims that one of the principal functions of work in America is "schmoozing"—

achieving a sense of companionship and togetherness among workers as they share their private lives and job-related experiences. When asked, "Why won't people work in their homes?," Peter Drucker responded by saying, "The work bond is still the most important social bond for most people, and to work in isolation is very frustrating for most people. One does need to be able to go to somebody and say, 'I can't figure this out. Help me.' One does need to gossip. One even need feuds! It builds community."[7] Rosabeth Moss Kanter, an organization development specialist, in effect agrees with Drucker when she states, "Working at home through a computer hookup may supplement work in the office, but it is highly unlikely ever to replace it. Workers see the office as a social place where they find a sense of belonging and being in touch."[8]

Another serious detractor from telecommuting has to do with the attitude of employers who seem resistant to the idea of workers not having to come to work. The traditional form of management no longer is appropriate for telecommuters. How can there be adequate supervision when there is no longer face-to-face interaction? What kind of production standards should be established? Who is responsible for the safety and security of the equipment? Should private, confidential information be transmitted? Such questions require managerial attention and the answers will result in managerial changes. Ronald Manning, general manager of office technologies at Control Data Corporation (CDC) which employs a number of telecommuters, is quoted as saying, "Management today is not typically trained to handle the employee who is out of sight. The normal manager is comforted by the fact that he can see his employees, talk with them and see them working hard."[9] IBM has conducted studies in their offices and found "the contact between office workers decreases relative to the distance between their offices. Double the distance between two workers and you cut the communication between them by a factor of four. Move them a floor apart and you cut contact by 90 percent. In other words, 'out of sight, out of mind'."[10]

Because computers require a basic understanding of how they function, many people are computer illiterate. For many, computerphobia is a reality—some people are intimidated by computers. Overcoming such a phobia may require considerable expenditure of time and money. Also, working at home requires a new set of disciplines. No longer does the commitment to get up and go to work exist. Now the worker must become self-motivated. A new sense of commitment must evolve.

Telecommuting is an isolating experience which could turn some workers into compulsive workaholics. The easy access to the equip-

ment may be too much of a temptation for some. Also, there may be a tendency to excessively polish the information being processed. The versatility of the equipment enables the operator to perfect copy to an extreme. This is not to imply that copy should not be perfect—it is to state that some workers may have a tendency to overdo their work.

Telecommuting may provoke union-associated issues as well. The influence of unions on information workers has been small. However, there may be a move to bring about unionization of such a cottage industry. Such barriers as mentioned above are not insurmountable; they are in reality serious problems which must be considered and dealt with if telecommuting is to become an acceptable mode of working.

HOW DOES ONE WORK AT HOME?

William Renfro writing in *The Futurist* gives a simple guide to keeping your sanity intact if you move your office home. The following steps are listed in "How to Work at Home":

1. Get dressed. Being "at work" is a role you assume daily, so you should wear a costume that suits the part. Wear whatever you would normally wear to the office.

2. Set up office hours. Post the schedule on your office door or where the family and friends can see it, and by the phone so you can remember to tell others. Practice saying, "I'll be at work from 9 to 5." And be there.

3. Get to work on time. Punctuality is important to maintaining a routine, so even if getting to work only involves a 20-foot walk down the hallway, make sure you're never late.

4. Quit on time, too. Don't linger over office headaches through dinner time. When office hours are over, take a walk around the block. You must find a way to leave the office behind you—literally.

5. See people. It's easy to become isolated from the rest of society when you spend 24 hours a day in your house. Incorporate a game of squash into your morning routine or a trip to the grocery store or newstand each afternoon. Meet the office gang at a local tavern after

work and join professional associations so that you can maintain your business contacts as well as our personal ones.[11]

CONDITIONS NEEDED FOR GROWTH

If telecommuting is to become a viable part of the American work scene, Jack Nilles believes that certain conditions must be met. The information sector must continue to grow beyond its present point of slightly more than half the U.S. labor force. Telecommunications and microelectronics industries must continue to grow in power at their current rate of close to 30 percent per year, and telecommuting software must be made widely available and affordable. Personal computers must also continue to grow in computational power per dollar. Energy shortages may prove to be one of the greatest incentives, causing employers and employees alike to reconsider the high costs of commuting.[12]

EXPERIMENTING COMPANIES

There are many companies experimenting with telecommuting. Such companies include Investors Diversified Services, Continental Illinois Bank in Chicago, Batterymatch Financial Management Company in Boston, Aetna Life and Casualty Co., Chase Manhattan Bank, Blue Cross/Blue Shield of South Carolina, Mountain State Telephone and Telegraph in Colorado, Bell Canada, Canadian National, Dome Petroleum, Bell Northern Research, Digital Equipment Corporation, Arthur D. Little, Inc., Data General Corporation, Walgreen's, and others. One of the first companies to study telecommuting and to prove its benefits, however, was Control Data Corporation of Minneapolis. CDC's first program in 1978 was designed to train handicapped people to work at home as programmers. CDS has several years experience, formal and informal, with the concept of full- and part-time employees working in their home or in work locations near their home in a voluntary work-at-home pilot project called "work station." CDC evaluated the concept of alternative work sites from a technical, social and economic viewpoint. Their findings support continuing with experiments of the alternate work site concept and developing a strategy of controlled growth of this concept. So far, management and employee guidelines and training programs have been developed, as well as legal and personnel policies and procedures.

If two to five million workers are going to be telecommuters by the year 1990, telecommunication will need to increase at an accelerating pace. New technology must give employers and employees options for doing their work. The final step will come when the electronic village gives way to the electronic cottage and the corporate work structure gives way to telecommuting.

•••

NOTES

1. Jagdish R. Dalal, "Computers and the Future," *Journal of Systems Management*, Vol. 32, No. 8, (August, 1981), p. 18.
2. Elizabeth Ferrarini and Gail Farrell, "Telecommuting: High Tech's New Cottage Industry," *Computerworld*, Vol. 16, No. 11a, (Special Issue, March 17, 1982), p. 63.
3. Margrethe H. Olson, "Toward Telecommuting?," *Office Automation Conference 1982 Digest*, (April 5-7, 1982), p. 495.
4. Dalal, *loc. cit.*
5. Norman MacRae, "How to Survive in the Age of 'Telecommuting'," *Management Review*, Vol. 67, No. 11, (November, 1978), p. 14.
6. Starr Roxanne Hiltz and Murray Turoff, *The Network Nation*, (Addison-Wesley Publishing Company, Inc., Reading, Massachusetts, 1978), p. 475.
7. *Concepts*, (Quarterly Publication of Wang Laboratories, Inc., Lowell, Massachusetts), Vol. 6, No. 4, (Autumn, 1982), p. 4.
8. *Boardroom Reports*, (Cambridge, Massachusetts), (August 15, 1981), p. 58.
9. "Commuting by Computer," *Newsweek*, XCVIII (May 4, 1981), p. 58.
10. William L. Renfro, "Second Thoughts on Moving the Office Home," *The Futurist*, (June, 1982), p. 45.
11. *Ibid.*, p. 47.
12. Jack Nilles, "Teleworking: Working Closer to Home," *Technology Review*, Vol. 85, No. 3, (April, 1982), p. 62.

Here are the names, addresses, and telephone numbers of a few of the many manufacturers of the technologies indicated:

Voice Store-and-forward

American Bell, Inc.
One Speedwell Ave.
Headquarters Plaza—West Tower
Morristown, NJ 07060
(201) 469-8850

IBM Corporation
1133 Westchester Ave.
White Plains, NY 10604
(914) 696-1900

ROLM Corporation
4900 Old Ironside Dr.
Santa Clara, CA 95050
(408) 988-2900

VMX, Inc.
1241 Columbia Dr.
Richardson, TX 75081
(214) 699-1461

Wang Laboratories, Inc.
One Industrial Ave.
Lowell, MA 01851
(617) 459-5000

Word Processing

Digital Equipment Corporation
Continental Blvd.
Merrimack, NH 03054
(603) 884-5111

IBM Corporation
400 Parson's Pond Drive
Franklin Lanes, NJ 07417
(201) 848-3454

Lanier Business Products
1700 Chantilly Dr. N.E.
Atlanta, GA 30324
(404) 329-8000

Wang Laboratories, Inc.
One Industrial Ave.
Lowell, MA 01851
(617) 459-5000

Xerox Corporation
1341 W. Mockingbird Lane
Dallas, TX 75247
(214) 689-6622